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Linoil warehouses are located in Boston, Hartford, Bayway N. J., Buffalo, Birmingham, Dayton, Indianapolis, Chicago, Moline, Milwaukee, St. Paul, Salt Lake City, Denver, St. Louis, Kansas City, Houston, Oakland Calif., Los Angeles, Seattle, Portland. Wherever you are a Linoil warehouse is near you.

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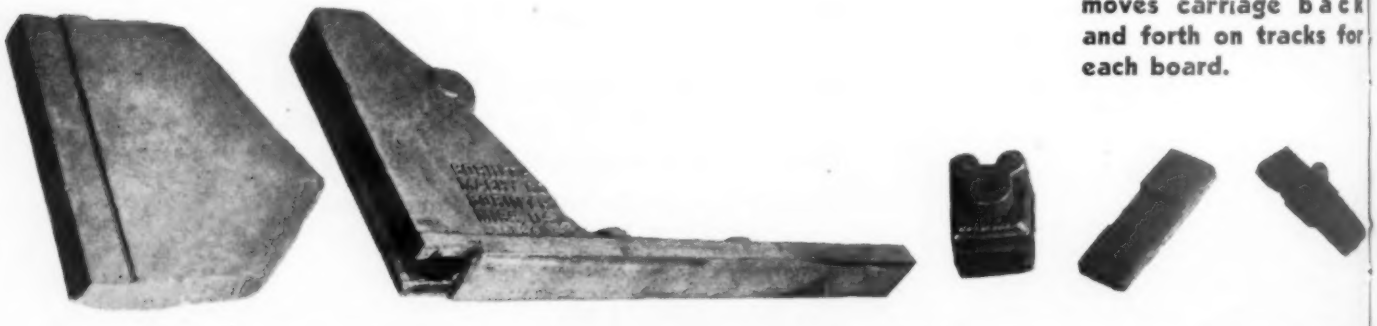
No conversion was necessary for The Corinth Machinery Company, Corinth, Miss., when war came for the Corinth Company was already a leader in the sawmill manufacturing field. The Army needed sawmills, big ones and little ones, in a hurry, and lots of them. Since the beginning of war the Army has taken 90% of Corinth's production.

Below is a core and casting for a sawmill knee. The boss dog bits are installed in this and the bits hold the log rigid as it is being sawed. Small casting is a doghead that also holds a steel bit for steadying a log. On the other page is a sheave wheel and core. Wheel is mounted on sawmill carriage and rope running in groove moves carriage back and forth on tracks for each board.



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War Production Still Is Major Obligation

VICTORY in Europe leaves the foundry industry with just one obligation . Until Japan has been defeated, castings to be used for machines and munitions of war must be produced on the schedules established by our military leaders. As long as it takes to fill the pipe lines to the Pacific theater and to build up sufficient surpluses to meet emergencies and battle expenditures in the campaigns against the Japs, production of castings must have the right of way over all other activities. Judging from the splendid accomplishments of the past five years in the face of many difficulties and discouragements, there can be no doubt that foundrymen in every division of the industry will meet the schedules.

But the problems of the industry become more complicated with the ending of one phase of the war. Regardless of the tremendous needs of our fighting men now in the Far East and those to be moved from Europe to the Pacific battle area, the surrender of Germany has resulted in certain shifts in production emphasis as well as termination of contracts which will have a marked effect on trends in the demand for castings. While these changes and initial moves toward reconversion to civilian production are likely to be rather gradual in the immediate future, more abrupt changes may be expected as war needs are fulfilled.

Although in many instances the problem of foundry conversion will consist of substituting civilian goods patterns for war production, the various industry groups and the individual companies will need to give attention to a number of important factors in the months immediately ahead. Proper equipment for most economical production is of prime importance. During the five years of war production much equipment has been worn out or has become obsolete and will require replacement. Reports of a marked increase in inquiries for various types of foundry equipment during the past few months indicate foundrymen are approaching reconversion with plans for plant improvement. As the supply of foundry workers increases, greater attention can be given to better housekeeping.

Keen competition from within and without the industry will follow a slackening demand for war production, and once again foundrymen will find it necessary to sell their products. Research will be needed to improve products and practices. Technical control will be required to maintain uniform quality of product. Accurate and uniform costing will be needed to permit profitable competitive selling. Perhaps some attention can be given to the problem of having engineers design the part so that it may be produced most satisfactorily as a casting.

War production is the job for tomorrow, but it should not be too early to do some planning which will permit the development of an even greater foundry industry when the Japs are licked.

Frank G. Steinebach
Editor

Magnesium Castings for Aircraft Engines

By EDWIN BREMER
THE FOUNDRY
and
HUEY SUMMERS
Wright Aeronautical Corp.
Cincinnati

DESIGNED for a monthly capacity of 750,000 pounds of castings, the magnesium foundry of Wright Aeronautical Corp., Cincinnati, located in a building 350 x 1040 feet with a main floor area of 364,000 square feet, undoubtedly is one of the largest of its kind in the world. The plant is highly mechanized to reduce the fatigue factor to a minimum, and 80 per cent of the cores used are made on core-blowing machines. Also, in many instances the work is broken down so that one operator performs but a single function.

As may be seen from the diagrammatic sketch, Fig. 11, production equipment is arranged so that there is a steady flow of materials in various stages from one end of the plant to the other. In addition to the foundry, the firm operates a large, well equipped pattern shop which is engaged primarily in repairing, modifying, checking and designing patterns for more economical production procedures. One development of that department is the application of electro-magnets in the interior of core patterns for holding chills and wires in place. This has made possible the use of coreblowing equipment in producing cores which otherwise would be made by hand.

Silica sand used for coremaking is brought to the foundry in railroad cars and unloaded into the boot of a bucket elevator which carries it up and discharges into any one of ten concrete storage tanks of 2000 tons capacity. A conveyor belt underneath the storage transports the sand from these tanks to either of two 15-ton capacity hoppers. From the hoppers the sand is discharged into a weighing-type tramrail car which carries it to any one of three 1000-pound capacity sand mullers. After mixing, the sand from the mullers is discharged into a 1000-pound capacity tramrail car and transported to the coreroom.

Regular core sand mixture used for both hand-made and blown cores is composed of 1000 pounds silica sand, 9 pounds cereal binder, 10 pints low-temperature baking core oil, 10 pounds sulphur, 10 pounds boric acid, and 1.7 per cent moisture. All materials first are mixed dry for 2 minutes; then the water is added, and mulling continued for 3 minutes; this is followed by addition of the core oil and mulling for 3 minutes. The silica sand is 60 to 65 A.F.A. grain fineness number, and contains from 3 to 6 per cent fines. Properties of the cores are a tensile strength, baked, of 140 to 180 pounds per square inch; green compression strength of 1 to 1½ pounds per square inch; surface hardness after baking of 85 to 95, and a baked permeability of 100.

Reclamation of both core and molding sand is accomplished through separate systems in a two-step process in shaking out. First the molds are placed on a vibrating grate or grizzly located just above the floor level, which rapidly separates the casting from the sand. The casting then is removed to adjoining vibrating grate (see Fig. 11) where it is left until all the cores are disintegrated. Under each set of vibrating grates is a traveling belt below the floor which carries the sand to the respective reclaiming unit.

Core sand is reclaimed in a 12-ton per hour capacity unit. Reinforcing wires, chills and core butts are removed on screens and by magnetic separation. Core butts are crushed in a core buster, and join the other cleaned sand flowing into an oil-fired, rotary kiln which is 5 feet in diameter and 24 feet long. After passage through the kiln all carbonaceous matter is burned from the sand. The sand then is subjected to a series of screening operations to remove the fines, and finally is carried to the storage bins or tanks.

Molding sand from the mold shakeout likewise is subjected to screening and magnetic separation to remove chills, reinforcing wires, and other undesired debris. The sand then is elevated to a long belt over three storage bins of 2000 tons capacity each. From these bins the sand is moved by belt to 15-ton capacity hoppers. Mixing of molding sand is performed in a set-up similar to that for core sand. Sand from the hoppers is weighed by tramrail car and discharged into any of three sand mullers. After mulling, the sand is discharged into an elevator

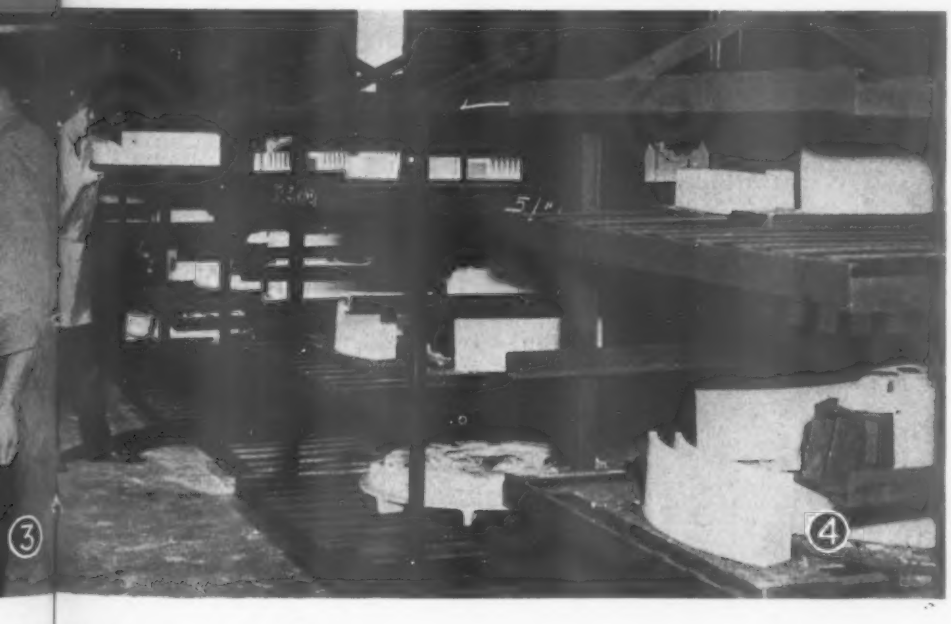


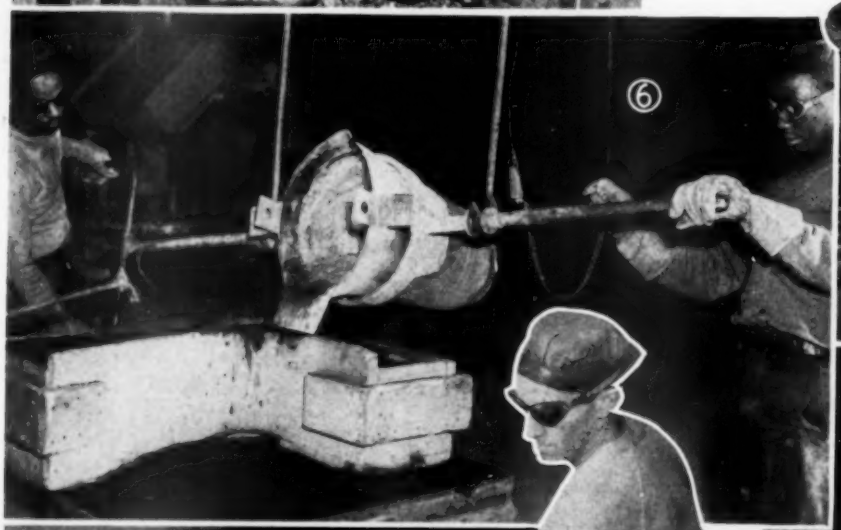
Fig. 1—Checking seating of core in mold at magnesium foundry of Wright Aeronautical Corp., Cincinnati. Fig. 2—Making mold for supercharger front housing. Fig. 3—Loading core onto conveyor for trip through oven. More than 60 different cores are required for the various castings. Fig. 4—Cores on platform type conveyor on way to oven. Cores are baked 4 hours at 350 degrees Fahr.

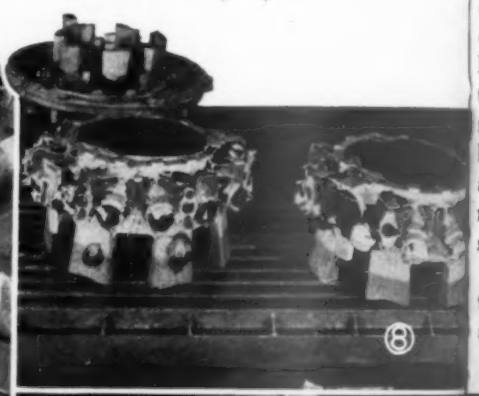
which carries it to a long conveyor belt. This belt traverses the foundry across the line of molding conveyors to the opposite wall, along the wall for a short distance and then returns over the line of molding conveyors to the sand mixing department.

Typical molding sand is composed of 700 pounds reclaimed sand, 15 pounds silica sand, 2½ pounds bentonite, 1½ pounds of a proprietary sand addition composed of ammonium silicofluoride, boric acid and sulphur, 1 pound ammonium silicofluoride, and ½-pound sulphur. Moisture content is from 2½ to 3 per cent.

Melting of magnesium is accomplished in 16 tilt-type, gas-fired holding furnaces, which have a capacity of 1700 pounds each. Holding furnaces are mounted in pairs, and each pair is served by a battery of ten crucible type, superheating furnaces. Crucibles are made of rolled steel and have capacities of 120 and 200 pounds. A ventilat-

Fig. 5—Skimming crucible before pouring. Fig. 6—Pouring a casting. All pouring is done under a hood with forced draft ventilation to draw off fumes. Fig. 7—While being poured into mold for nose section casting, molten magnesium is fluxed with mixture of sulphur and boric acid to prevent burning. Fig. 8—Core sand being removed from castings on vibrating grid. Fig. 9—Machine for blowing large cores. Fig. 10—Metal is melted in this holding furnace and then transferred to smaller crucibles for superheating. Fig. 11—Diagram showing general layout of Wright foundry





ing hood covers each group of two holding and ten superheating furnaces. The ventilating hood is somewhat unusual in that it performs two functions, drawing off the gases and fumes through the center, and supplying fresh air under pressure along the edges of the hood. In winter the incoming air is heated.

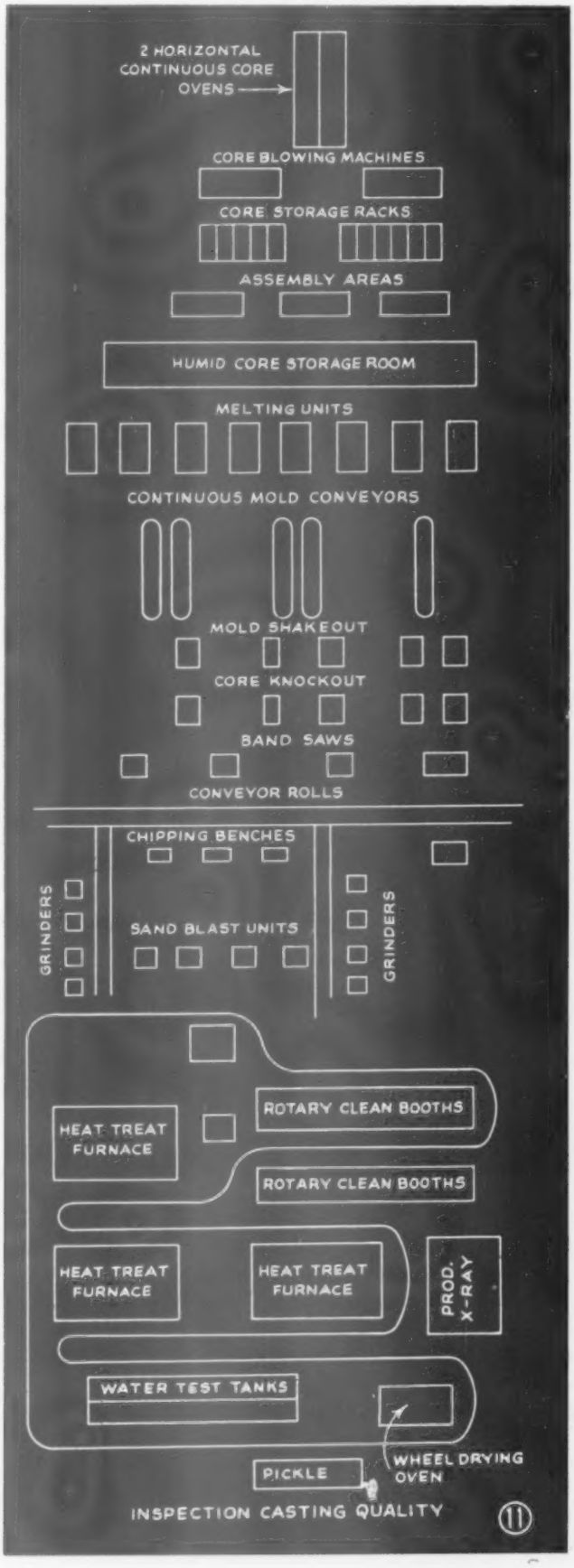
Temperature control of metal in moth melting or holding furnaces as well as in individual superheating crucibles is maintained by an elaborate system. Thermocouples are inserted in each pot, and the thermoelectric currents developed are transmitted to graphic, recording instruments, located in a glass enclosed control room. Instruments are four-point recording, and indicate the temperatures of four furnaces at 4-minute intervals. Temperatures are observed by a corps of women attendants, and as the metal in the furnaces reaches the desired temperatures, signals are flashed to the furnace operators on electrically operated signal boards. Each battery of furnaces is served by a signal board.

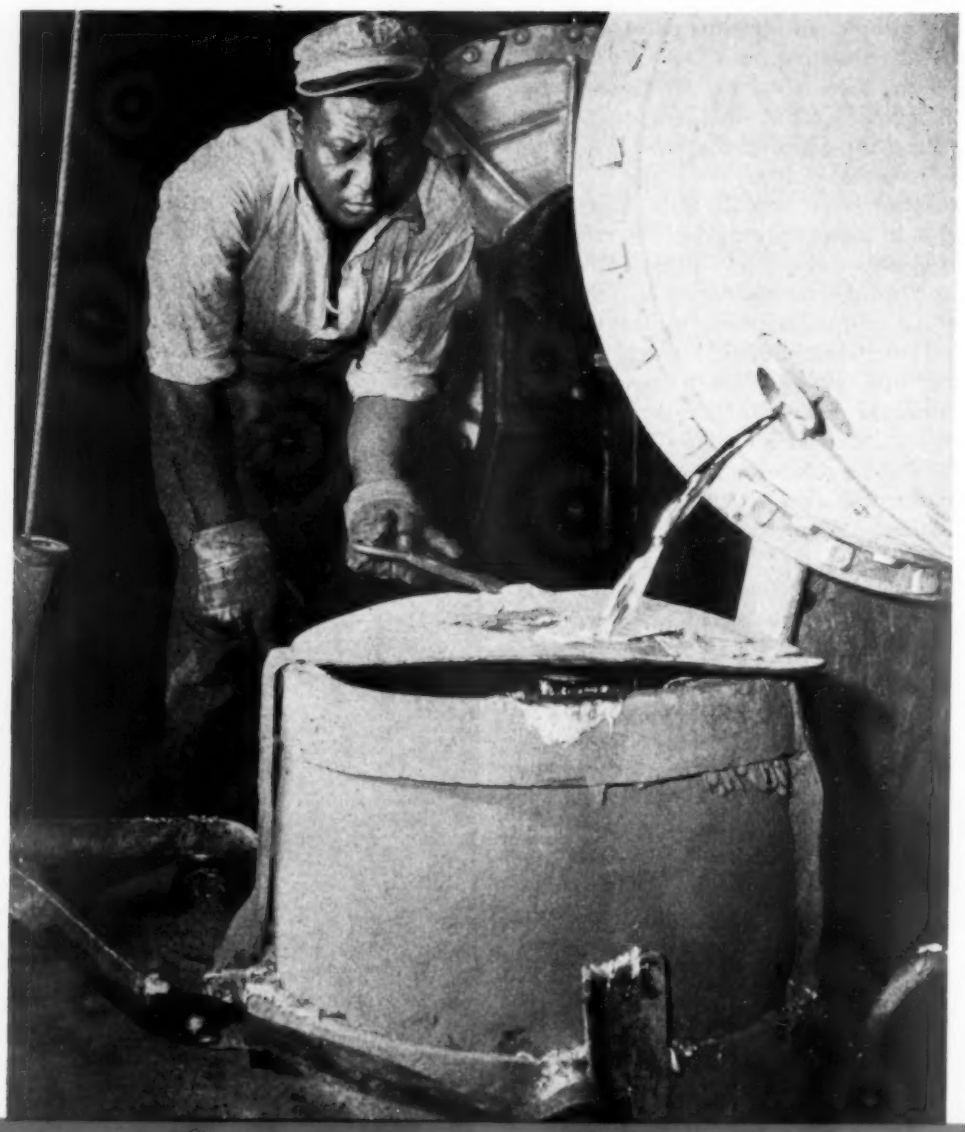
Melting procedure follows a definite schedule which is adhered to closely. A heel of approximately 450 pounds of molten magnesium alloy is left in the holding furnace from the previous heat, and it is carefully freed from dross by use of a perforated steel hoe. In addition, the sides of the melting pot are scraped clean. Then 50 pounds of flux is added, followed by 1250 pounds of ingot metal and remelt. The whole then is dusted with the same flux and from time to time more is added to prevent burning.

When the temperature recorder in the control room indicates that the temperature will level off at 1225 to 1275 degrees, the attendant signals the melter, who reduces the heat. When the temperature levels off, the melter removes the thermocouple and puddles the heat with a steel stirrer for 5 minutes. The thermocouple is reinserted, and the heat increased to bring the temperature to between 1320 and 1370 degrees Fahr. When that range is reached the melter is signalled, and the metal is poured into smaller super-heating crucibles.

The metal is dusted well with flux, and heated to 1250 to 1300 degrees Fahr. It is given a light coating of flux and then stirred well for 200 times, with the stirring action directed toward the center of the crucible. Stirring is continued until the metal has a definite silvery look which takes about 2 minutes. The crucible is skimmed and the metal given a light coating of flux. The thermocouple is inserted, and the metal tem- (*Please turn to Page* 190)

(10)





ALUMINUM foundry practice

THE present day aluminum foundryman is called upon to produce castings not only of rigidly specified quality from the large number of available aluminum alloys with widely diversified foundry characteristics, but also he is often required to select the alloy which will produce the casting most suitable for the purpose for which it is to be used.

In selecting the proper alloy for his castings, the foundryman has learned that it is poor policy to sacrifice quality for the sake of convenience. For example, prior to the war considerable quantities of cookware appeared on the market cast from No. 12 and other similar improper types of alloys, because such alloys were cheap and easy to cast. The public soon discovered the poor quality of this cookware and, as a result, a certain stigma became associated with such cookware products.

The term "proper alloy" should not be interpreted to designate the source of aluminum from which the alloy is produced, but rather the alloy of the correct composition which will develop consistently the desired physical properties or corrosion resistance in the casting.

The shortage of aluminum during the present war has been largely responsible for dispelling the old "boogey man" formerly associated with aluminum alloys produced

from scrap. Because of the necessity of using scrap to produce aluminum alloys, it soon became apparent that scrap properly refined and blended into an alloy was just as satisfactory in many cases as one produced from primary aluminum.

As previously indicated, there are a large number of aluminum alloys, each of which has foundry characteristics peculiar to itself. However, there are certain general foundry practices which are applicable to all of the aluminum alloys.

To melt and pour aluminum properly in the foundry, uniformly heated furnaces with adequate temperature control equipment are essential. Melting too fast or localized over-heating of the crucible or iron melting pots are common causes of so-called "hard spots" in castings, and excessively high metal temperatures cause the well known gas or pinhole porosity in the cast metal.

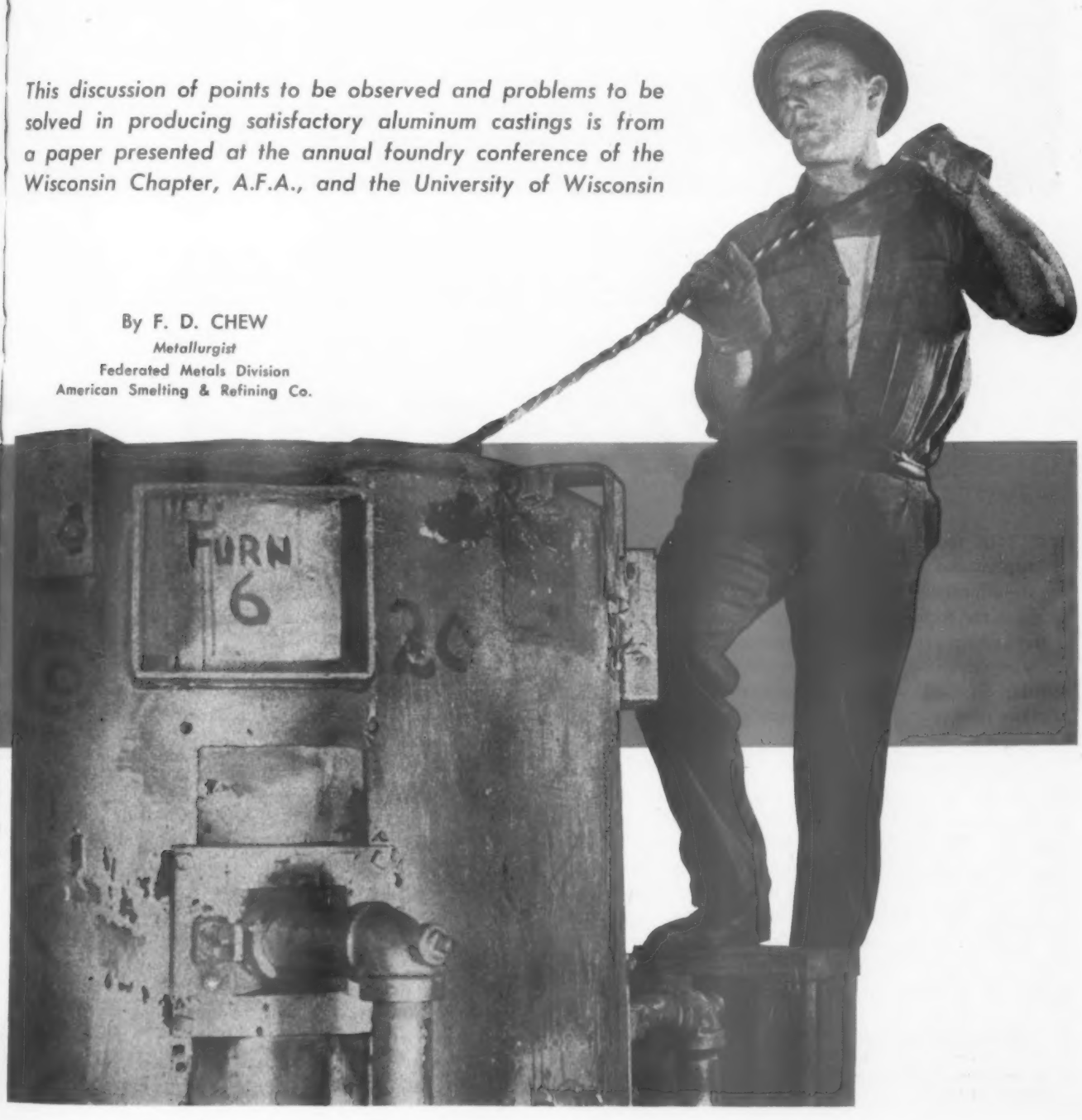
As a result of the objectionable iron pickup by molten aluminum, it is preferable to melt in crucibles. However, iron pots can be used satisfactorily, provided they are regularly and adequately treated with protective coatings. A very good coating for this purpose consists of a primary wash of a parting compound followed by a wash of a proprietory insulating powder (sometimes called "red mud"). This double wash dries to a hard resistant coating relatively impervious to attack by molten aluminum and can also be used to coat iron skimmers, stirrers, hand ladles and other accessory melting or pouring equipment.

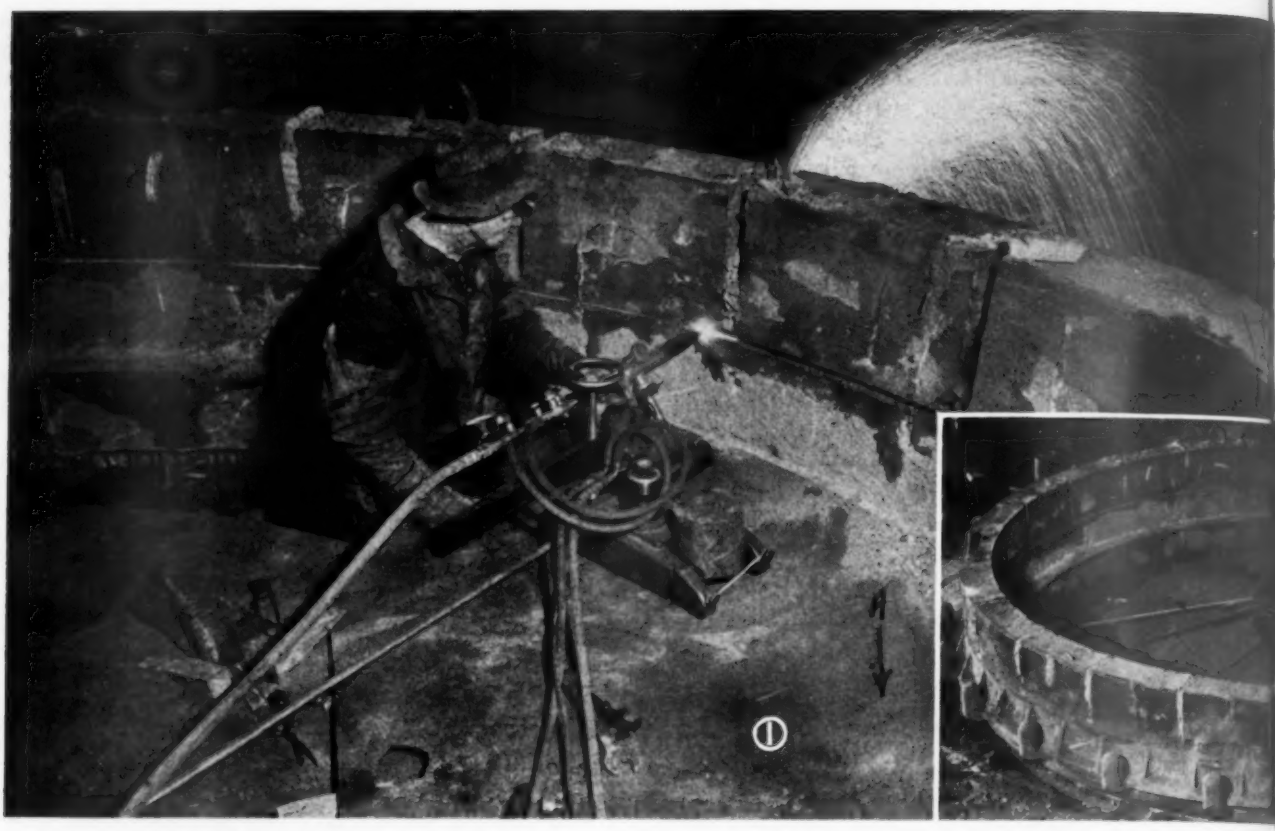
High temperature melting and pouring of aluminum should be avoided, because it may be the cause of many undesirable conditions in foundry operations and result in lower physical properties in the castings as follows:

1. The useful life of the furnace pots, crucibles and tools is decreased rapidly by continued operation at excessive temperatures. (*Please turn to page* 220)

This discussion of points to be observed and problems to be solved in producing satisfactory aluminum castings is from a paper presented at the annual foundry conference of the Wisconsin Chapter, A.F.A., and the University of Wisconsin

By F. D. CHEW
Metallurgist
Federated Metals Division
American Smelting & Refining Co.





Removing Risers and Padding by MACHINE FLAME

IN THE founding of steel castings a large amount of superfluous metal must be added to the casting for metallurgical and design purposes. This metal is added in the form of risers and padding. It forms no part of the casting proper and its removal is an important and costly operation. The problem of removing heads and padding on steel castings is discussed in this article and a solution presented in the form of oxyacetylene machine flame cutting.

It is an accepted fact that steel contracts in volume upon solidifying. If, in molding, no importance were attached to this fundamental characteristic, the casting would be unsound. The reason is simply that a casting solidifies from the outside face towards the center, and, as the center section is the last to solidify, it would contain a shrinking cavity. In order to exclude this shrinkage cavity from the casting proper, pools of molten metal known as feed heads or risers are provided as required. They serve as a means of securing directional solidification, are the last part of the casting to solidify, and, under ideal conditions, contain the shrinkage cavity. These pools are not part of the casting and are essential only to insure the soundness of the casting. They must be removed when the casting is cleaned.

In foundry terminology, feed heads which taper off toward the wall of the casting are often referred to as pads or padding. In this manner progressive solidification is obtained from the bottom to the top of the section and sound metal obtained in the casting.

Excess metal on a casting, referred to as padding, is sometimes added to a section of a casting for the purpose of securing metal of maximum density in that section, because, when molten metal is poured into a sand mold, large quantities of gases are generated, of which small quantities may be trapped near the surface of the casting to cause some degree of porosity. It is intended that this porosity be contained in the padding which can later be removed. This type of padding, when used, is customarily added to trunnions, bearing surfaces and sections of a casting likely to be highly stressed.

The accepted procedure for removing heads and padding in a large steel foundry producing castings for ord-

The opinions and assertions contained in this article are those of the authors, and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.

nance is to use oxyacetylene hand cutting equipment. Flame cuts obtained from this type of equipment leave much to be desired when considered with respect to the amount of metal to be removed by subsequent rough machining. This is particularly true when snag grinding and chipping facilities are limited.

In many instances it becomes necessary to place heads and padding in locations which are difficult and relatively inaccessible for snag grinding, chipping or rough machining, and the problem becomes more complex as the castings become larger and more intricate in design. In addition to these factors, the initial cost and operating expense increase greatly for the type of equipment required for their removal.

The demand placed by the war effort upon foundry and machine shop facilities, and especially on large machine tools, has dictated the utmost economy in machine hours to obtain maximum production from available equipment. It becomes obvious, therefore, that any methods employed in the initial removal of shrink heads and padding from steel castings should, if they are efficient, produce a clean smooth surface and leave an absolute minimum of metal to be removed by further processing.

The drain on skilled manpower by the armed forces requires that any method for removing superfluous metal from castings take into consideration the lack of experienced personnel. It is therefore logical and within sound reasoning to employ simple mechanical methods of processing wherever possible.

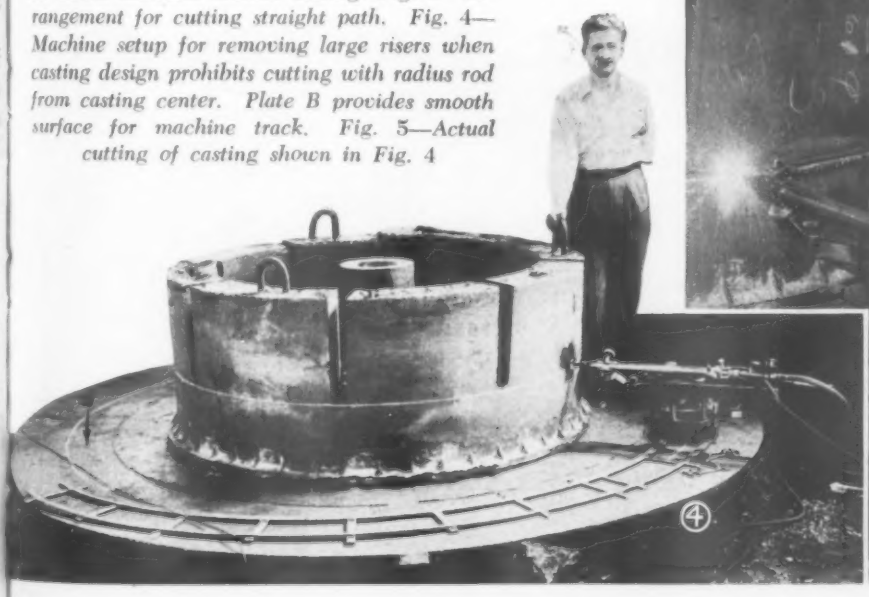
Many methods for removing risers and padding from castings were examined; these indicated that machine flame cutting wherever applicable would be more satisfactory than hand flame cutting in the light of factors previously mentioned. That is, machine flame cutting (a) leaves after initial cut a minimum amount of metal to be removed by further processing; (b) produces a smooth clean cut; and (c) requires a minimum of additional training for personnel in order to obtain satisfactory results.

A survey of commercial oxyacetylene machine cutting equipment revealed a number of standard machines as suitable for this purpose. For initial development, it was decided to utilize a flame cutting machine similar to an Airco radiagraph and employ accessories designed to meet specific requirements.

By LT. R. J. WOLF, USNR
and
J. H. McKLVEEN
Metallurgical Engineer
U. S. Naval Gun Factory, Washington

ECUTTING

Fig. 1—Actual operation in removing riser from large steel casting by machine flame cutting. This is same casting as shown in Fig. 2. Plate A supports the machine. Note radius rod used to direct machine around casting. Fig. 3—Arrangement for cutting straight path. Fig. 4—Machine setup for removing large risers when casting design prohibits cutting with radius rod from casting center. Plate B provides smooth surface for machine track. Fig. 5—Actual cutting of casting shown in Fig. 4



Flame cutting of iron or steel, whether hand or machine, involves the direction of a jet of commercially pure oxygen into an area that has been previously heated to the ignition or kindling temperature. This temperature is approximately 1600 degrees Fahr. The jet of oxygen oxidizes the iron or steel away and the process becomes one of supplying heat and oxygen in a controlled manner. Flame cutting equipment, including torches, tips and other accessories, is readily obtainable from a number of commercial sources in a wide variety of sizes and styles, each particularly adapted to a specific application.

An interesting example of the application of machine flame cutting to the removal of risers from steel castings is shown in Fig. 2. Here a large circular casting without any internal structure offers an excellent opportunity to employ this form of cutting. This figure shows the general technique and arrangement of equipment that can be employed for castings of this type; the machine used to carry the torch can be seen plainly along with the radius rod which serves to guide the machine in a circular path.

Fig. 1 shows a close-up of the actual cutting operation. The cut was started through one of the split heads, carried down to the line of demarcation between the head and the casting and then around the casting. The head thickness is 10½ inches, the torch and cutting tip are of the size recommended by the manufacturer for cutting this thickness of metal, while oxygen and acetylene pressures were optimum. It will be observed that the machine permits both horizontal and vertical adjustment of the torch. The speed of the machine is variable and, in this case, was approximately 4 inches per minute. The steel plate supporting the machine can be advanced as the cut progresses; this plate is identified as *A* in Figs. 1 and 2.

Fig. 4 shows a machine flame cutting technique employed to remove the risers from a cylindrical type casting with internal structure. This design prohibits the operation of a flame cutting machine with a radius rod from the center of the casting. Accordingly, a circular track around the outside is used for uniformly directing the machine. To insure a continuous cut, the track is sectional with (*Please turn to Page* 234)

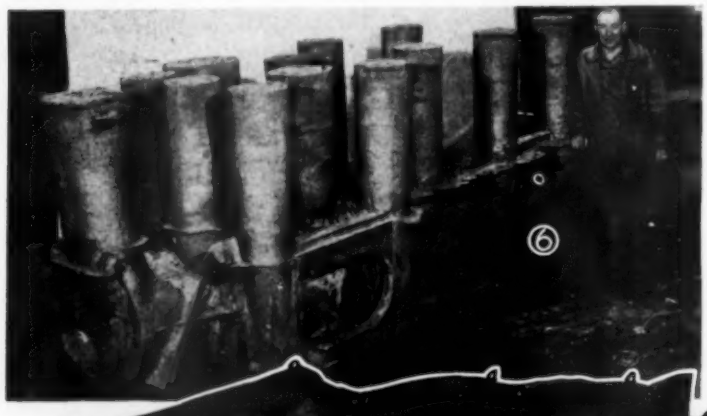
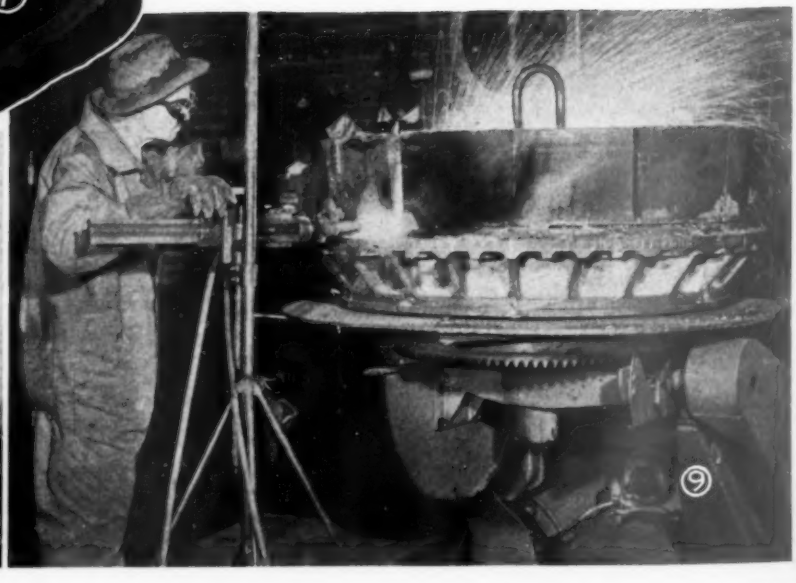


Fig. 6—Large steel casting before removing risers and padding. Fig. 7—Same casting shown in Fig. 6, after risers and padding removed by machine flame cutting. Risers indicated at A, padding at B, irregular points where cutting was followed by hand scarfing at C. Fig. 8—Removing 18-inch diameter riser with machine torch mounted vertically. Supporting plate B was cast and machined especially for this use. Fig. 9—Cutting risers with torch stationary and casting mounted on welding positioner to provide means for rotation at required speed



GRINDING in foundries

By C. A. CARLSON
Abrasive Engineer
Norton Co., Worcester, Mass.

FOUNDRIES were among the first to use artificial abrasives. The first artificial abrasive invented was silicon carbide, which is particularly well suited for grinding cast iron. With very little knowledge on our part of the differences in analyses, we have noted quite a difference in grinding wheel behavior on certain kinds of cast iron. However, with few exceptions the grinding is done with silicon carbide wheels vitrified or resinoid bonded.

The vitrified wheel has several qualities which make it preferable for much of the grinding done. Because of its porosity and strength of bond the material removed per cubic inch of wheel wear is high. It is not affected by water, acids, oils, climatic or ordinary temperature conditions.

The resinoid bond is used for the majority of high speed wheels in foundries. The rate of stock removal is generally in direct proportion to the speed, and resinoid bonded wheels are designed to operate at 9500 surface feet per minute, while vitrified bonded wheels run at 6000 surface feet per minute.

The most essential factors to be considered in choosing grinding wheel specifications that will do a given job best are: 1. Material to be ground; 2. Amount of stock removed, accuracy and finish required; 3. Area of contact, and 4. Type of grinding machine.

The kind of abrasive is largely determined by the properties of the material to be ground. Generally speaking, aluminum oxide wheels are more suitable on materials of high tensile strength, that is, where the material is neither very brittle nor very easily penetrated. Such materials range from hard, tough alloy steels to the tougher varieties of alloy bronze and aluminum. Silicon carbide wheels are most efficient on materials of lower tensile strength, such as cast iron, hard malleable iron, soft brasses, aluminum alloys and copper.

As a rule, very hard, dense materials require a relatively soft grade of grinding wheel. Hard materials resist the penetration of the abrasive grains and cause them to dull quickly. Softer grades enable the worn, dull grains to break away and expose new sharp grains.

To effect economy with a given grinding wheel, there are two important factors under control: 1. Wheel speed and 2. Grinding pressure. Increases in either of these factors generally increase the economy of snagging.

Application will be discussed from the standpoint that an increase in the rate of production is a gain in economy. A higher rate of production means lower labor and overhead cost per unit of product.

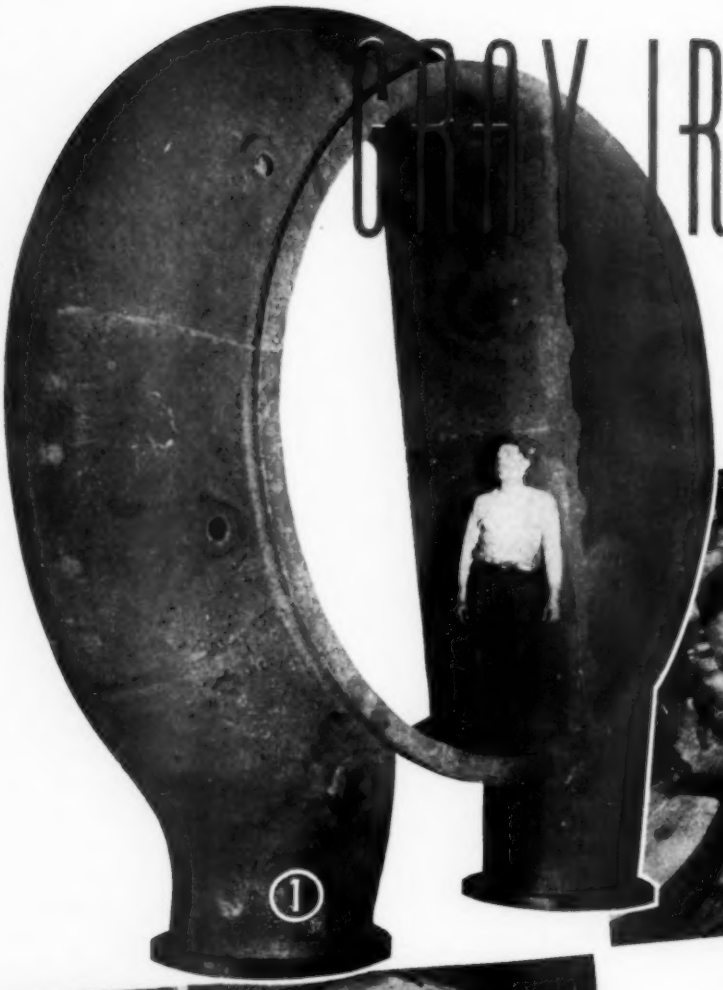
1. *Wheel speed.* From a simple geometrical consideration, the amount of material removed from the work under constant pressure grinding is the same for each revolution of the wheel. Therefore, rate of cut is proportional to surface velocity of the wheel. In practice and within limits, rubber and resinoid wheels approach a fulfillment of this geometrical prediction. Vitrified wheels do also but within more narrow limits.

Safety is the most important limit of high wheel speed. Maximum safe speed depends upon type of bond, bonding strength in the wheel and character of machine. Practical maximum speeds are 6000 surface feet per minute for vitrified snagging and 9500 for the rubber and resinoid type.

2 *Grinding pressure.* The (*Please turn to page* 250)

GRAY IRON CASTING

for Power



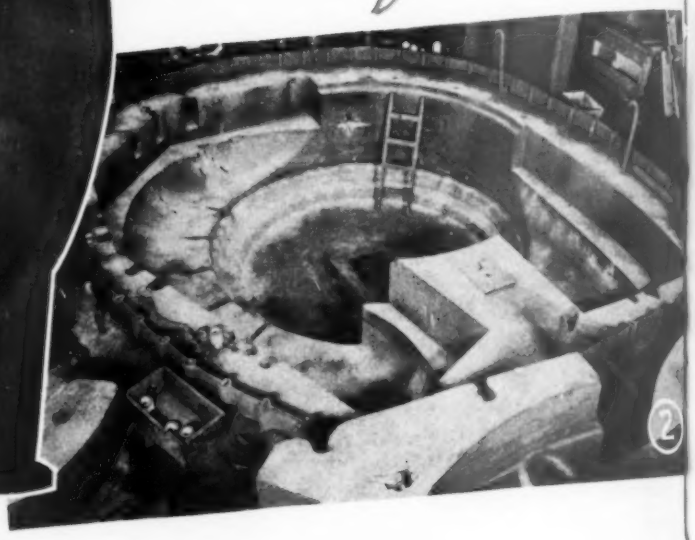


Fig. 1—Showing the general size and shape of a large gray iron casting made in the mold seen in Fig. 2. Upper part of the mold was formed by a number of dry sand cores. Number and position of the gates at the rounded end are shown in the illustration. Figs. 3, 4, 5, 6 and 7 Progressive stages in molding a large half turbine casing. With the exception of a flat face in the bottom of the pit, the entire mold is formed by sectional dry sand cores. Layout of the gating system on the bottom of the mold is shown in Fig. 3

This is the second and concluding article describing the production of gray iron castings by the Elliott Co., Jeannette, Pa. The first article appeared in the May issue

Plant Equipment

By PAT DWYER
Engineering Editor
THE FOUNDRY

WITH certain changes in method of foundry operation, planned for the coming year and already on the drawing boards, the Elliott Co., Jeannette, Pa., is maintaining a reputation for progres and adoption of modern methods and equipment as they have been developed over a period of more than 30 years.

Many of the employes, probably the majority, with periods of employment ranging from 10 to 30 years, have seen these changes go into effect and readily have adapted themselves to conditions. Stout iron flasks and bottom plates have taken the place of the old time wood flasks, long since broken up and converted into kindling wood for the cupola. Sand with uniform physical characteristics is prepared mechanically in one location and distributed to various points in the foundry as required. This removes one of the variables present when molders and helpers prepared their own backing and facing sand according to their individual judgment. Although in contemplation for some time, adoption of new methods was accelerated by a demand for peak production of castings and a marked decrease in the supply of foundry labor.

By the way, if one may be pardoned for a brief comment or digression, since this condition prevails throughout the entire industry, it will be interesting in future years when the foundry is neither on top of the feverish production wave nor in the bottom of the idle trough, to note how the information will be applied by the learned statisticians, the compilers and dispensers of more or less useless information. One prominent speaker or writer will show in the clearest possible manner that the introduction of every piece of mechanical equipment has thrown several worthy and highly respectable people out of employment. A proponent of the second school can show without the shadow of a doubt that the owner of a plant was forced into the use of mechanical equipment when a sufficient number of the aforesaid w.&h.r. people failed to show up when the starting whistle blew in the morning, or at any other hour. The foregoing sapient observations are offered for no particular reason, except perhaps in the pious hope they may serve as the basis for a fight or an argument at a chapter meeting.

Mechanical charging of the cupolas is in prospect at the Jeannette plant of the Elliott Co., and may be in actual operation before this description appears in print. Magazine people also have their little problems.

Up to the present the cupolas have been charged by hand. Coke and limestone are loaded in barrows in the yard and taken up to the charging platform on an elevator. Pig iron, cast iron and steel scrap are lifted by a magnet suspended from the yard crane and placed upon an extension to the charging platform in separate piles. They are loaded by hand on trucks as required and weighed on a platform scale in the center of the charging platform and then thrown into either one of the two cupolas, one lined to 42 and the other to 54 inches diameter.

Metal charge for the small cupola is 1000 pounds and

for the larger cupola 2000 pounds, with 125 pounds of coke and 30 pounds limestone for one and 250 pounds coke and 60 pounds limestone for the other between charges. The resulting metal treated according to the proprietary Meehanite method is tapped at a temperature of 2800 degrees Fahr. and no attempt is made to reduce the temperature before it is poured into either small or large castings. The only reduction in temperature is the small amount lost during the time the ladle is in transit from the cupola to the mold or molds. Ladles are hauled into the north bay on a buggy running on a narrow gage track.

Briefly stated, the metal prepared according to the patented Meehanite process is based on the discovery that calcium silicide causes graphitization of the cementite without otherwise affecting the composition. The process is a development of experiments carried out several years ago independently by A. F. Meehan in this country and by Oliver Smalley in England which eventually culminated in the formation of the Meehanite Corp.

The calcium silicide is placed in a funnel-shape container on the charging floor, and the required amount for the quantity of metal in the ladle flows down through a pipe which discharges into the stream of metal in the cupola spout. Slight adjustments in the amount are based on a chill test of the iron from each tap. Small triangular test bars 4 inches in length, ¾-inch across the back face and ⅛-inch at the thin edge are made in small core molds. When the metal has solidified the mold is broken. The test bar is picked up with a pair of tongs and laid for a few seconds horizontally in a shallow water bath. Then it is picked up again and lowered gradually in a vertical position into a deeper bath. It is then placed on two supports and struck with a hammer to break it in the center. The penetration of chill on the sharp edge is measured on a small special gage and to the practiced eye of the observer, indicates the quality of the metal. Time, temperature, chill and several other items of operating data are entered on a large blackboard during the progress of the heat, and later form part of a permanent record in the history and performance of any given casting.

Facilities are provided in a large, well equipped laboratory for investigation, research and routine analysis. Test bars coming in here conforming to accepted A.S.T.M. standards, 1.20-inch diameter and 21 inches in length, are cast in pairs vertically in a core mold. The patterns are pulled out through openings in one end of the corebox. The resulting castings are smooth, clean, straight, accurate in dimension and without the parting line fin found on similar castings molded horizontally from split patterns. Chemical analysis is performed on drillings taken from near the end of the bar. The remainder of the bar is utilized in various testing machines to determine torsion, deflection, compression, transverse and tensile strength.

Contemplated changes in general shop operation include a conveyor line in the north bay for handling molds and empty flasks; erection of a number of concrete bins in the east end of the south bay for storage of new sand; utilization of an adjoining building for storage of miscellaneous supplies and materials; (*Please turn to page* 216)

Fig. 8—*A plain box pattern forms the bottom face and walls of the mold. Arms, brackets and other interior members are formed by a black sand core mixture. Fig.* 9—*Medium weight repetition castings are molded in substantial cast iron flasks on molding machines. Fig.* 10—*Large black sand cores are made and dried on heavy cast iron plates. Fig.* 11—*Partial view of the cleaning room*

THE GRAY IRON INDUSTRY • PRESENT AND FUTURE •

By W. W. Rose

Executive Vice President
Gray Iron Founders' Society Inc.

THIS war has been an ordeal for all of us, but particularly for the men of the gray iron foundry. We entered it practically unknown, largely through our own folly and rugged individualism. We did not appreciate our own importance, nor the vast scope covered by our product. Each foundry thought of itself as the industry, whereas there isn't a single plant of ours in the country which caters to more than a microscopic part of the more than 500 industries and branches of agriculture which use gray iron castings, either as an integral part of their production equipment or in their product.

Outside of the product of the blast furnace and steel mill, the gray iron foundry industry produces a larger tonnage than the producers of all other materials of engineering put together. However, looking back to the days when the rumbling of war first began to be heard, we received but scant consideration. "This was to be a steel war, an aluminum war, a magnesium war" — such was the slogan that resounded through the country. Our first warning of what was to come was in January, 1941, when we heard rumors of the price control on scrap. I sped to Washington from Cleveland to learn that the steel man at the head of the scrap department didn't know that gray iron foundries used steel scrap and wasn't planning for us at all.

Throughout the summer of 1941, I made trip after trip, trying to guard our supplies from the unwitting grab of the vast army of officials which was gathering in Washington. To them, gray iron, or "cast iron" as they called it, represented fire plugs, lamp posts and manhole covers and there was no demand for such articles in war. Engineering gray irons were unknown to these people.

Finally, the association directors did a very smart thing. They authorized the opening of an office in Washington. This was done on Sept. 1, 1941, and I doubt seriously if it will ever be closed in my time.

In the meantime, heavy machine tool foundries were faring pretty well so far as orders went, because the machine tool builders knew that gray iron was essential to their product. But the light production shops were nearly frantic. A few got some orders under the guise of semi-steel, (whatever that is), and trade names, but the general outlook was very black indeed. The society sent committee after committee to Washington, but they received little attention. I walked miles through the corridors of the war buildings carrying test bars and small castings in my pocket, but if they were shiny they were made of steel, and that's that! The Army said gray iron pulverized on the impact of high explosives and the Navy said it shattered and became a menace to personnel even in the presence of a near miss. It seemed strange to me, having fired so many target practices with big guns in my youth, using gray iron shells, that the material should now act so oddly on land and entirely differently at sea. But such was the verdict given by officials of the Army and the Navy.

Vehicles such as tanks, trucks and light motor craft were to abandon the gray iron piston engine and operate on rotary airplane engines, and so the sad story proceeded.

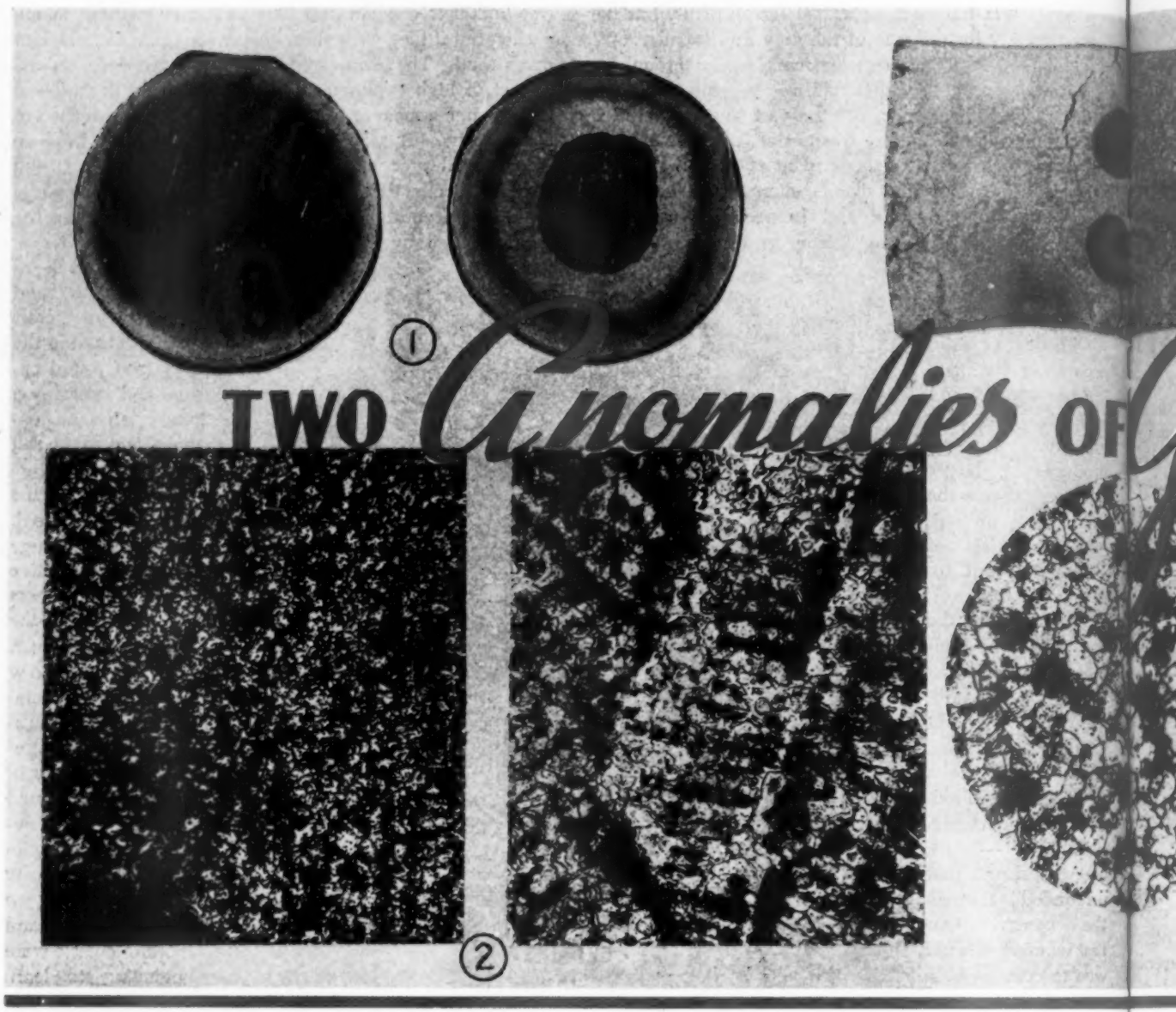
Meanwhile, some foundries closed, such as the huge captive automotive plants, and others just gave up for the duration or forever, we don't know which. Their manpower was transferred to the glamorized war plants, or joined the armed forces. Then, slowly but surely the picture began to change. Tooling up had gone far and those in charge were beginning to learn that gray iron and malleable iron had their uses and their virtues not possessed by substitute materials. But the labor horse had been stolen.

The union leaders, acting in the capacity of official "labor advisors" to the manifold offices and bureaus, thought that would be the right time to make a drive for higher wages for workers who had stuck to the foundries. They opened the campaign with a slogan, "Hot, heavy, dirty, dangerous and underpaid," which we have ample proof originated with the foundrymen themselves. Have you heard that cry before?

Would it surprise you to learn that the weekly earnings in the gray iron industry in January, 1945, averaged $52.63? This is an increase of 121.4 per cent above the average in January, 1939, 72.8 per cent above January, 1941, and a rise of about 22 per cent since passage of the Wage Stabilization Act of October, 1942. These are taken from the official figures of the Bureau of Labor Statistics.

The "Hot, heavy, dirty" slogan was welcomed by the high government officials, as it furnished them with an alibi for their stupid mistake in not utilizing our basic industry and in permitting its manpower to be drained.

Now may I be permitted to digress a little to examine what wartime officialdom is (*Please turn to page* 226)



TWO Anomalies of Graphitization

By LESTER CROME
Metallurgist
Dayton Malleable Iron Co., Dayton, O.

SILICON, the outstanding graphitizer, is, under certain conditions and perhaps acting indirectly, influential in forming or stabilizing iron carbides.

The production of malleable cast iron is the process of making white iron castings with the carbon all combined, followed by a rather lengthy heat treatment to decompose all the carbides. The carbon content is about 2.50 per cent and a typical silicon would be about 1.00 per cent. The idea is to carry the silicon as high as possible to promote graphitization in the annealing process but low enough to avoid any primary graphitization.

If a ladle of this white iron be given a ferrosilicon addition sufficient to cause the specimen to have a gray instead of a white fracture (0.20 to 0.60 per cent silicon) we have an example of the powerful graphitizing effect of silicon. Now if this specimen, along with one not treated with silicon and having its carbon all combined, be subjected to the normal malleablizing heat treatment, in slag packing in ring type pots, it will be found that the untreated metal will be completely graphitized while the specimen with the silicon addition going into the malleablizing heat treatment largely graphitized will come out with considerable carbides still present. These carbides may be in the form of both pearlite and cementite. The cementite formations give the impression they may have formed from the coalescence of the cementite plates in pearlite.

The outer part of the silicon treated specimen will be rather badly deteriorated. It will have no strength and the microstructure resembles none of the familiar iron carbon structures. Next to this will be the carbides which may be in a band of more or less width or may extend to the center, depending on the length of time and other conditions of the heat treatment and also on the amount of primary graphitization. Fig. 2 shows the microstructure of edge and center of a specimen having the carbides retained in the center.

If the malleablizing treatment be carried out in a tight container with charcoal so as to have an atmosphere composed essentially of carbon monoxide and inert nitrogen at the high temperature part of the cycle, the phenomenon will not occur or, at any rate, to no appreciable extent.

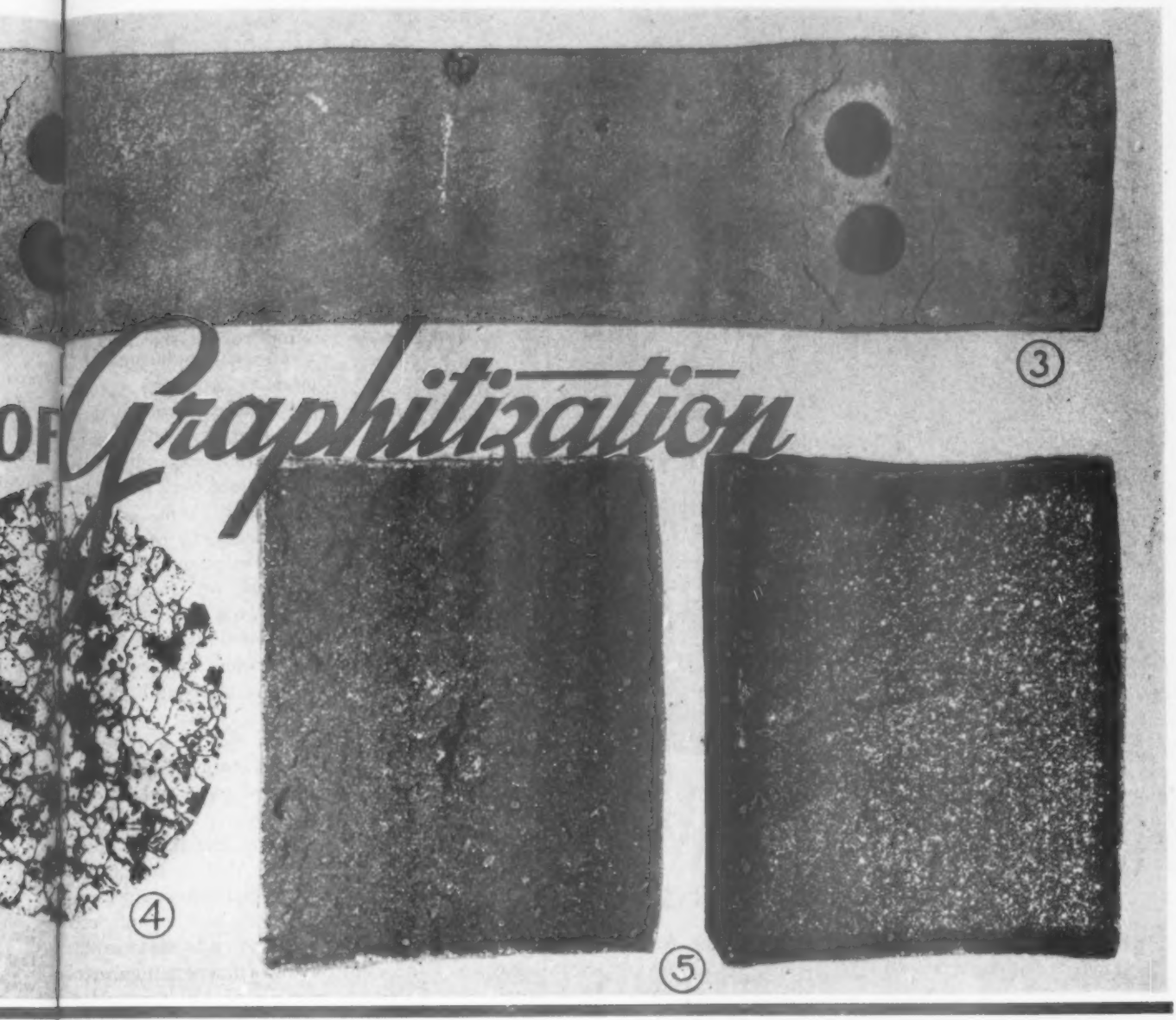


Fig. 1—Malleable melt with 0.60 per cent silicon ladle addition. Specimen at left had short exposure to high temperature; specimen at right had longer exposure. Etched with nital, 2X magnification. Fig. 2—Malleable melt with 0.50 per cent silicon ladle addition and normal anneal cycle. Edge of specimen at left; center at right. Etched with nital, 100X magnification. Fig. 3—Bar 1¼ x 2 x 12 inches cast from soft gray iron. Ends sawed off and four ½-inch holes drilled. Through malleable anneal cycle twice. Fig. 4—Malleable iron with 0.04 per cent aluminum ladle addition. Etched with nital, 100X magnification. Fig. 5—(Left)—plain malleable iron; (right) same iron with 0.04 per cent aluminum ladle addition. Normal anneal cycle

If the malleablizing treatment be carried out in air with no large amount of carbon oxides in the atmosphere, it occurs only to a limited extent. The zone of deteriorated metal at the surface is not so deep and the carbide containing band is very narrow, about the width of a line drawn with a fine pen.

If the malleablizing treatment be carried out in the atmosphere of the products of combustion, an atmosphere with a relatively high carbon dioxide content, the phenomenon occurs to a large extent, indicating that carbon dioxide plays an influential part.

If specimens are withdrawn from the high temperature exposure after various time intervals and later given a short low temperature treatment to decompose the pearlite, it will be found that specimens with very little exposure to high temperature will graphitize completely except for a trace of carbides at the surface.

The carbides will be stabilized at the surface first, and as the time of exposure to high temperature increases the stabilized zone penetrates toward the center, followed later by the metal deteriorating behind it. Fig. 1 shows the effect of time at high temperature on the extent of penetration. The specimen on the left had 6 hours at 1600 degrees Fahr. The one on the right had the same treatment plus 36 hours at 1700 degrees Fahr. All were in the atmosphere of the products of combustion. After air cooling from the high temperature they were reheated to 1300 degrees Fahr. for 5 hours to decompose the pearlite. The specimen at left with the short exposure at high temperature has some carbides at sur- (*Please turn to page* 246)

FOUNDRY FACING MATERIALS

By DR. J. A. RIDDERHOF
Manager, Facing Department
Frederic B. Stevens Inc., Detroit

PROBABLY the oldest material to which the term "facing" has been applied is seacoal, which is a bituminous coal ground to several degrees of fineness. From 5 to 16 per cent of seacoal is used in facing sand and it is generally accepted that the seacoal and the facing sand should be of about the same fineness.

The theory of the action of seacoal, of course, is the formation from its volatile matter of a cushion of gas between sand and metal which makes castings cleaner and smoother. This gas appears to be reducing in nature, which means a decrease in oxidation of the metal surface. One investigator found that seacoal softens at about 700 degrees Fahr. and develops flowability to compensate for sand grain expansion. He also found that above 1500 degrees the coking of the particles compensates for the shrinkage of the clay. Another investigator claims the gas from seacoal exerts a slight chilling action on metal.

The fines in seacoal are important since they coat the sand grains with carbon, preventing them from sticking together and making the removal of the sand easier. Too many fines, on the other hand, causes too great a drop in the permeability of the facing sand and results in too rapid an evolution of gas. At one point in the pouring of metal, coal tar distills from the seacoal and acts as a binder for the sand.

Unless the proper grade of seacoal is used in the right percentage, serious defects may result. For example, the presence of coarse seacoal particles at the sand surface can result in pock-marks and eruptions on the casting surface. If too much seacoal is used, and particularly if it contains an excess of fines, the defect known as mapping may occur. When iron is poured against facing sand containing too much seacoal, the particles give off their volatile matter, then coke and swell, expanding the mold surface until it buckles and cracks; iron, entering these cracks, forms irregular fins on the casting surface.

Seacoal, when used in increasing percentages, has been found to increase sintering point, dry and green compression strength, mold hardness, temper moisture and gas and to decrease expansion, contraction, flowability and green and dry permeability.

Several investigators have reported that seacoal causes a large reduction in permeability. A number of tests were conducted in the writer's laboratory to measure this effect. To a molding sand having a fineness number of 76, seacoal with a fineness number of 110 was added. From a permeability of 63 with no seacoal added, the value dropped to 62 with 4 per cent seacoal and to 52 with 8 per cent seacoal. Seacoal with a fineness number of 150 then was used. From a permeability of 63 with no seacoal added, the value dropped to 54 with 4 per cent seacoal and to 49 with 8 per cent seacoal. Considering that 4 per cent seacoal is a 12 to 1 volume ratio, and 8 per cent is a 6 to 1 volume ratio, the drop in green permeability from 63 to 52 in one case and from 63 to 49 in the other is by no means serious.

Since these results differ so markedly from those reported by others, an investigation was made to determine the reason. The first clue to present itself was the shape of the seacoal particles, for it can be reasoned, and correctly, that a shaley coal that grinds to more or less flat particles would certainly obstruct the passage of air through the facing sand more than would a coal that shows a definite cubic structure after grinding. Upon examination, the seacoal used in the above experiment was found to be cubic and the answer to the discrepancy in results appears to have been found.

Within the last year or two we have been asked, "What effect does the fusion point of the ash from seacoal have on the ability of facing sand to withstand the sintering action of hot metal?" Dietert (*Please turn to page* 260)

Let's Have More Research!

By EDWIN BREMER
Metallurgical Editor
THE FOUNDRY

INDUSTRIAL supremacy of the United States has been built principally on huge natural resources, leadership in mass production ability and technology, but two of those influences are gradually receding. The war has been using up our natural resources at a tremendous rate, and shortages of tin, rubber, manganese and other essential materials have revealed that our boasted self-sufficiency was merely an evanescent fancy. Likewise, other countries have not been asleep as to the advantages of mass production, and gradually are adopting that procedure.

Probably the most important category upon which our industrial supremacy has been erected and maintained is technology—a combination of many attributes. It includes technical and mechanical skills, research and ingenuity which involve imagination and ability to foresee human wants before people are aware of them and to develop devices, machines and methods of supplying them. Continued leadership, therefore, relies primarily upon technology. Every effort must be made to maintain it at the peak by encouraging and supporting technical education and the institutions which provide it—public and private research laboratories, and large and small engineering laboratories.

Research is one of the essential elements of technology, and in the form of organized industrial research is the road to economic progress. For example, one large chemical firm points out that in 1928 it was selling a great many products which it thought were modern. In 1942 it was selling still more, but in that year 46 per cent of its gross sales consisted of products that either did not exist in 1928, or were not then manufactured in large commercial quantities. It has been stated, and justly so, that about one out of every four persons gainfully employed today owes his job in whole or in part to developments based on scientific research.

Benefits of research touch every person in some manner or other, and accomplishments are so widespread and varied that a good sized volume, perhaps several, would be required just to outline them briefly and cite their advantages. A few illustrations might include the sulfa drugs, manufacture of toluene (an ingredient of TNT), high octane gasoline and synthetic rubber from petroleum, plastics, radio, automobile, airplane, radar, television, telephone, phonograph—and getting a little closer to home, the development of various foundry equipment, alloys and alloying agents, expansion of investment molding, production of cast armor steel tank turrets and hulls, etc.

While the foundry industry has not neglected research altogether in its march of progress and advancement, the surface of its possibilities hardly has been scratched. Both producers and consumers of ferrous and nonferrous castings agree that those products today are vastly improved over those of ten or even five years ago, but they admit that superior castings can be made consistently when certain whys and wherefores can be answered. For example, John W. Bolton in the 1943 Foundation Lecture of the American Foundrymen's Association stated:

"An objective of research is the maintenance and improvement of the competitive position of the industry. The actual work may concern such items as: (a) The raw materials used, directly and indirectly. (b) The product, castings. This includes such factors as mechanical properties, use of alloys, and study of design. (c) The processes—for example, melting and molding. (d) Applications and uses of products—at present one of the weakest links in the foundry structure—as long as thought is centered on price per pound. (e) Fundamental principles and theory. (f) Promoting justifiable extension of usage of cast products."

Mr. Bolton also points out that—"Foundries which conduct research directly are in the minority, yet all foundries pay for research. In many cases those who pay most dearly are those who, without research, or even good control, have great and hidden losses. Often wastages and losses are unsuspected. Thorough check-up may reveal surprising things. Riding on the other fellow's developments is far from a safe or conservative business policy."

Research involves both effort and expenditure, and naturally some return should be expected. While the latter may be direct, it often takes a long time, and sometimes returns are difficult to evaluate in concrete terms. Contrary to the belief of the average individual, research does not require a genius—long haired or otherwise—who bobs up at the critical moment with the answer to the $64 question. Rather it is composed of controlled experiments, precise and systematically recorded observations and an attempt to correlate cause and effect. Research is ninety-nine per cent perspiration and one per cent inspiration.

As previously mentioned, re- (*Please turn to page* 232)

WHAT IS BEING DONE . . .

Activities of the nation's research laboratories will have an important influence on post-war uses of materials and methods of fabrication. Research in foundry products and foundry practices must keep pace with developments in other industries if castings are to maintain or improve their competitive position among engineering materials. In order to give a picture of the present status of foundry research work, THE FOUNDRY is preparing a series of articles describing the leading foundry laboratories of this country, their accomplishments and scope of their studies. The first of this series will appear in an early issue.

Magnetic Powder

This discussion of magnetic powder use for disclosing defects in steel castings is part of a symposium on magnetic particle testing to be published shortly by the American Society for Testing Materials

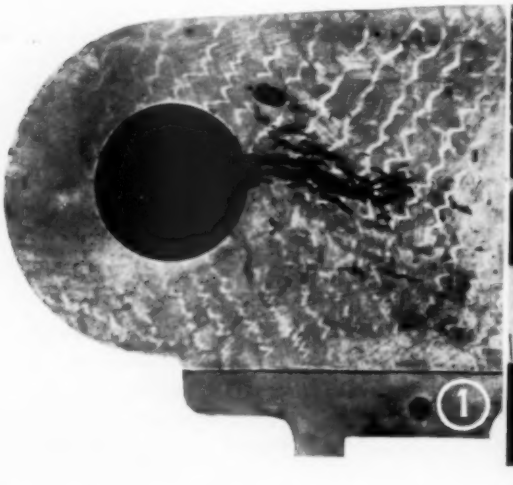
By CLYDE L. FREAR
Senior Materials Engineer
Bureau of Ships
Navy Department, Washington

ALTHOUGH radiographic examination was required by the Navy Department as early as 1930 in the inspection of seams in welded boiler drums, it was not until 1936, at which time gamma-ray technique was developed by the Naval Research Laboratory, that radiographic inspection was required on cast materials.

In the beginning, this method of inspection was specified only on those castings produced by Navy Yard foundries. Somewhat later, because of the rather general discovery of defects in hull castings, radiographic inspection was specified in contracts for important and highly stressed hull castings. The necessity for such inspection to determine internal defects was made doubly important with the advent of lighter sections to provide decreased weight. Combined with permission to repair defects by welding, radiographic examination has provided one method to insure soundness in critical areas of castings which enter into the construction of combatant vessels. In 1939, with the advent of the increased program of Naval construction, specifications required that all castings subjected to superheated steam, all castings in the main steam system and all hull castings directly concerned with maneuvering the vessel be subjected to radiographic inspection.

Although radiographic inspection has not been completely effective in preventing service failures, such failures have fallen to a very small percentage of those experienced prior to specifying this method of nondestructive testing. An order specifying radiographic inspection does not necessarily require that all parts of any casting or even that all castings be radiographed. The fact that any casting may be subjected to such inspection has usually provided fairly definite insurance that the necessary effort has been exerted by the foundry to produce castings free from harmful defects. In cases where defects have been discovered, it has usually been possible to make any necessary repairs.

While magnetic powder inspection has been used for some time in testing forgings, and to a certain extent in inspecting ordnance castings regularly subject to high shock in service, this method of inspection has not generally been specified for ship castings. Because of lack of willingness by the steel foundry industry in general to use radiography when first specified, it was not desired at that time to add the burden of an additional inspection method. It was also believed that radiography would indicate all harmful defects with the possible exception of certain surface



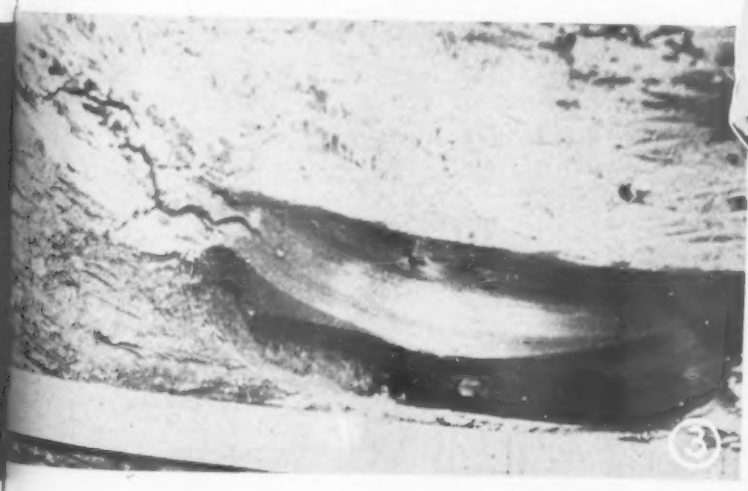
Inspection OF CASTINGS

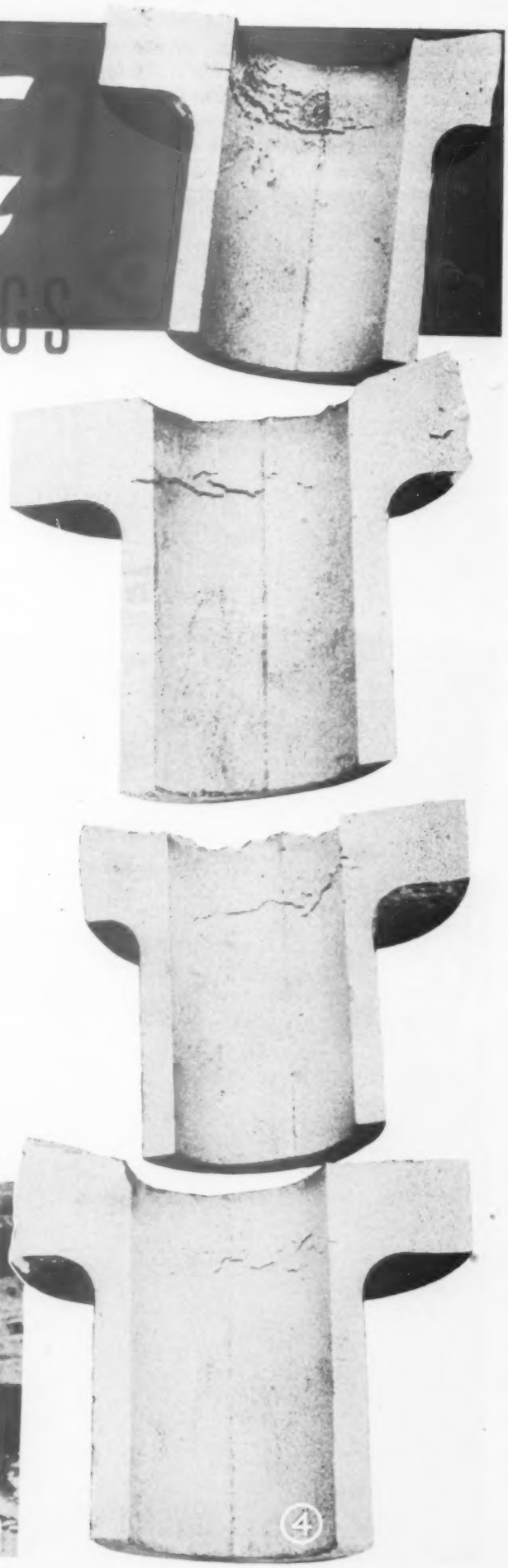
cracks which would be found by visual inspection. It was noted, however, that occasional valves and fittings which had successfully passed all radiographic inspection and hydrostatic tests at twice the service pressures developed leaks through the bolt holes of flanges; and although radiographed after such leakage was discovered, no definite defect could be found on the negative. Upon subjecting the casting to magnetic inspection, however, a discontinuity was noted having the form of a hot tear or a crack running circumferentially around the bore immediately under the flange.

Further magnetic inspection by naval activities and by commercial foundries showed that approximately 30 per cent of all flanges produced contained this hot tear defect, which in most cases was invisible to the eye, and which could not be indicated by radiographic inspection—even when the exact size and direction of the defect was known, and a source and film location was used which would provide the maximum rendition of the defect.

On other occasions shipyards had installed rudder posts which had been found to be radiographically sound or in which defects had been repaired. Upon boring these cast-

Fig. 1—Magnetic particle indication of shrinkage. This defect was not located by magnetic powder inspection until the part was machined. Fig. 2—Magnetic powder indication of hot tear on rough surface of casting. Fig. 3—Magnetic powder indication of hot tear leading from a shrinkage cavity. Fig. 4—Magnetic powder indications of bore cracks under flanges





ings it was noted that the chip was breaking in a certain location and upon examination of the machined surfaces a very fine crack was discovered. As the casting was already assembled in the hull, repair of the defect was difficult and time consuming. Upon removal of the crack by chipping it was found to extend completely through the casting in such a location that it could easily have been located by powder inspection but could not possibly have been found by radiographic examination.

As a result of these experiences the Bureau of Ships has specified that hull and machinery castings which are required to be radiographed shall also be subject to magnetic powder inspection in those locations which are highly stressed in service and in those locations where defects have previously been found but which were not detected by radiographic means because of their dimensions being too small or because of their occurrence in exceptionally heavy sections.

Magnetic powder inspection consists in magnetizing the part to be tested, sometimes by direct application of electro-magnets but usually by inducing a magnetic field itself by the passage of an electric current through the part or by placing the part in a magnetic field. Where any discontinuity is present in the metal being tested there is a leakage of the magnetic lines of force around the discontinuity through the surrounding metal and through the

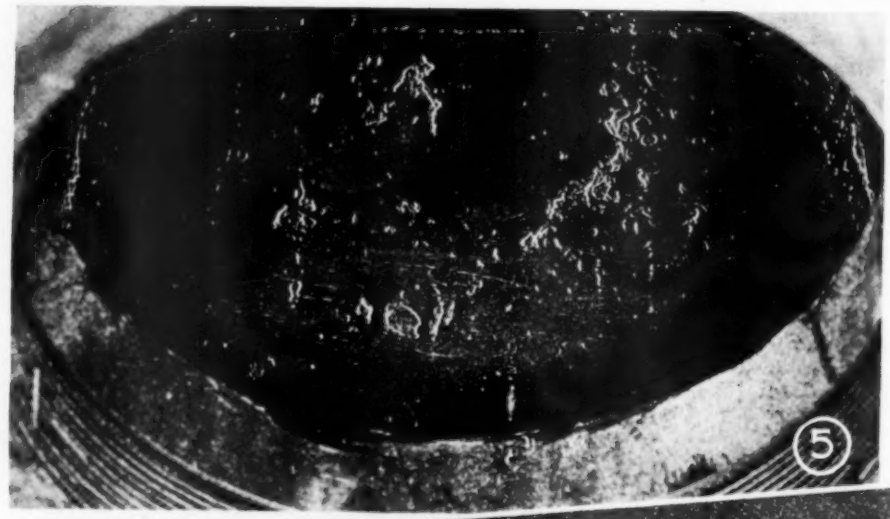
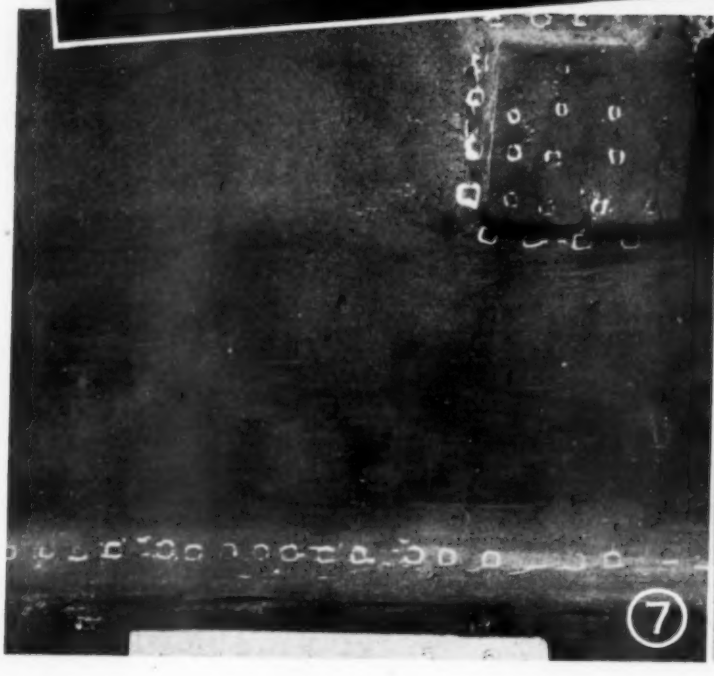
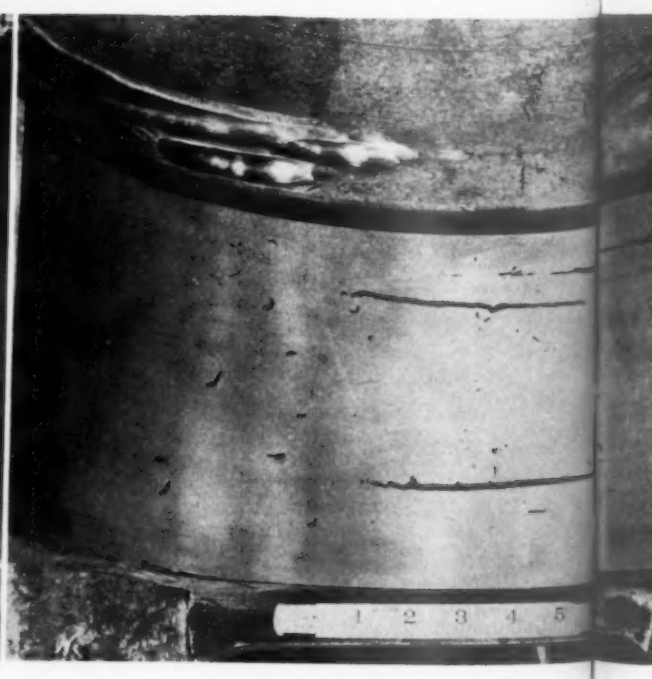


Fig. 5—Extensive areas of light shrinkage that were disclosed only by magnetic powder inspection





air. When a magnetic powder is applied to the part by dry dusting or suspended in a liquid vehicle, this powder will arrange itself along these magnetic lines of force and will tend to "pile up" at the discontinuities where the lines, being bent out of their regular direction, will tend to be more concentrated, thus producing more intense magnetic fields at these points.

As the agglomeration of powder on the surface results almost entirely from flux leakage through the air, it is evident that a surface defect will be shown to greater advantage than will a subsurface defect. As the depth of the defect under the surface increases a greater number of lines of force will be able to pass through the metal; therefore, less flux leakage will occur through the air. It follows, therefore, that as the defect becomes more deep seated, the powder indication will become less evident, tending first to lose its sharpness, then becoming progressively wider until finally no flux leakage through the air will occur and no powder indication will be produced.

Before discussing the application of magnetic powder inspection to steel castings, it will be well to consider the types of defects which occur, their cause and their locations and extent within the casting.

Sand inclusions—Sand inclusions may result from any of the following:

1. Failure to remove all loose sand from the mold cavity.
2. Allowing loose sand to enter the gate after closing the mold.
3. Weak sand at the walls of the mold cavity because of insufficient strength or insufficient ramming.
4. Failure to reinforce fillets.
5. The presence of sharp corners in the mold.
6. Careless handling of the mold permitting cracking and breaking.
7. Use of a sand with insufficient refractoriness.
8. Use of sand having weak cleavage planes permitting decrepitation under influence of the high temperature of the steel.

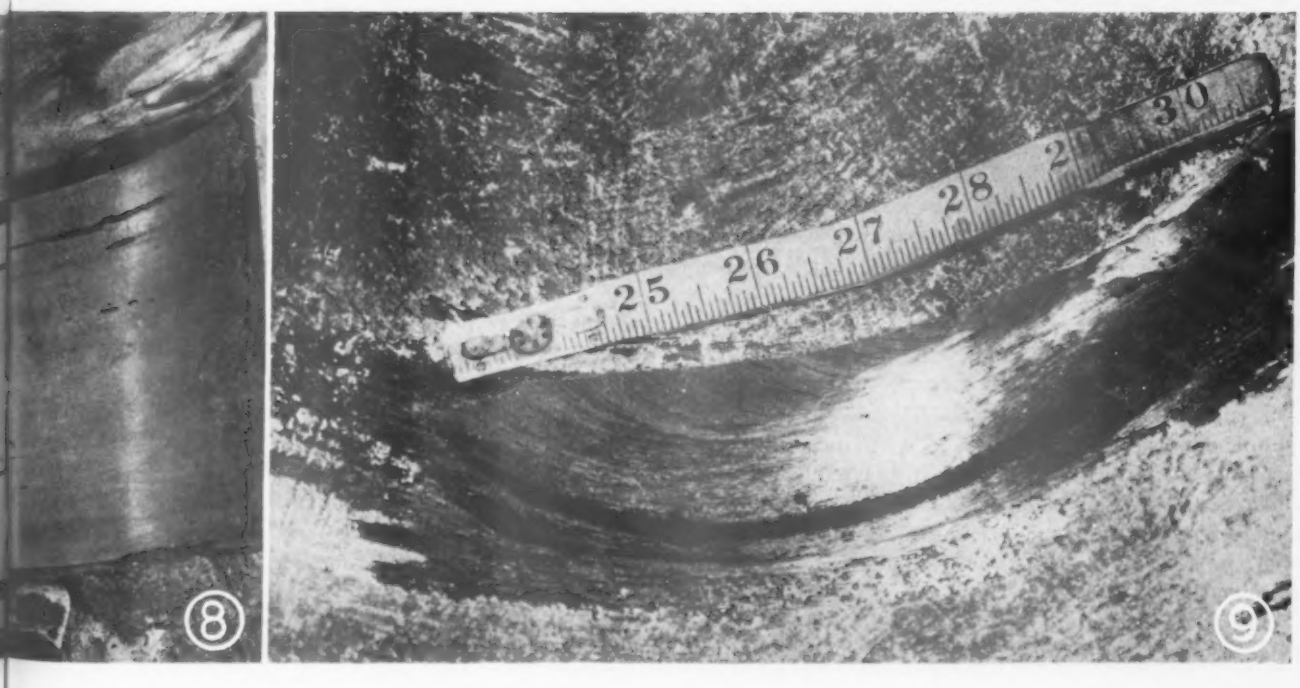
Summarizing the foregoing, anything which will permit sand to enter the molten metal in the mold cavity will result in sand inclusions unless this sand floats on the surface of the metal and is carried out through the risers. Sand inclusions may appear as single grains with a size and shape comparable with those of the original grains used in making the mold or core, or they may be made up of a number of grains agglomerated into individual clumps.

In many cases sand inclusions will appear on the surface where they may be found by visual inspection and removed or repaired without chipping or grinding an excessive amount of metal. In other cases they will be just below the surface where they may cause sufficient flux leakage to be identified by magnetic powder inspection. Deep lying inclusions if indicated at all would probably not be recognized as such by magnetic inspection.

Slag inclusions—When the metal in a top pour ladle is not thoroughly skimmed, the slag may enter the mold with the stream of metal. Such slag will usually become entrapped in the metal and may be found in almost any location as irregular rounded inclusions, which will give magnetic powder indications similar to sand inclusions.

Gas porosity—Gas porosity may appear in several forms. Air which may be carried into the mold during pouring and which is not ejected from the metal before solidification will be entrapped as small rounded cavities. Such cavities will usually be more numerous in the cope portion of the casting than in the drag. A similar type of gas cavity is often present (*Please turn to page* 272)

Fig. 6—Magnetic powder indication of unfused chaplet. Fig. 7—Magnetic powder indications showing incompletely fused chill nails. Fig. 8—Magnetic indications produced by chills. Chaplets and chills may give magnetic powder indications despite complete fusion. Fig. 9—False indication due to concentration of flux in thin section at bottom of chipped area



Injuries and Accident Causes IN THE F

By FRANK S. McELROY
and
GEORGE R. McCORMACK
Industrial Hazards Division
Bureau of Labor Statistics
United States Department of Labor

IT IS generally recognized that every accident may be traced to the existence of an unsafe working condition, to the commission of an unsafe act by some individual, or to a combination of these accident-producing factors. The correction of unsafe working conditions generally is entirely within the powers of management. The avoidance of unsafe acts, on the other hand, requires cooperation and understanding by both management and workers. Management must take the lead, however, by providing safety-minded supervision and by making sure that all workers are acquainted with the hazards of their operations and are familiar with the means of overcoming those hazards.

Over 90 per cent of the foundry accidents which were analyzed in this study were found to involve both an unsafe working condition and an unsafe personal act. It is apparent, therefore, that any successful foundry safety program must include measures designed to eliminate both of these accident-producing factors.

Unsafe working conditions—Foundry operations undoubtedly present a wide variety of inherent hazards, and the problem of achieving safe working conditions may seem more difficult than in most other industries. Still there are obvious and well known methods of overcoming practically all foundry hazards, and the existence of unsafe working conditions generally may be taken as an indication of slack supervision.

The great majority of the unsafe conditions revealed by the accident analysis fell into five general categories. Within individual plants the relative importance of these categories of unsafe conditions varied widely. It is apparent, however, that foundries generally should: (1) improve housekeeping conditions in and around all workplaces; (2) provide and require the use of adequate personal safety equipment in all operations presenting hazards which such equipment can overcome; (3) provide mechanical equipment or sufficient assistance when heavy or bulky materials are to be lifted or moved; (4) regularly inspect all tools, material, and equipment for defects, and immediately repair or replace all defective items; and (5) provide and require the use of proper guards for machinery and equipment.

Hazardous arrangements or procedures—The importance of good housekeeping and of the closely allied condition of safe plant layout as a means of avoiding accidents cannot be overemphasized in any foundry safety program. Thirty per cent of all the foundry accidents for which full details were available were directly related to poor housekeeping conditions or unsafe work layout. In the gray iron and steel foundries this group of unsafe conditions outranked all others, and in the malleable iron foundries it was the third most important category of unsafe conditions.

Materials and equipment placed in irregular and unstable piles, stored materials which encroached upon aisles and workplaces, loose materials and equipment left in aisles and workplaces, and congestion of materials in small spaces were outstanding among the poor housekeeping conditions which led to accidents. Many workers were struck by materials which fell from improperly built piles; others bumped into the projecting corners of uneven or improperly placed piles of materials; and still others slipped on loose sand on the floor or tripped over tools, materials, vehicles, and debris lying in walkways or workplaces.

Objects Fall on Workers

A not unusual example of the accidents included in this group was described in a report covering an injury experienced by a worker in the course of taking a coreplate from a pile. The pile, which extended above his head, was composed of various sizes of plates and at the time of the accident a small plate was on top. This small plate, however, was pushed back and was not visible to him. As the worker pulled off what he thought was the top plate, the small plate slid from the pile and struck his head. In another instance three flasks, weighing approximately 10 tons, had been piled on rails which were resting upon a large casting, bearing upon the cement core of the casting which had not been removed. Vibrations from an air drill caused the cement core to crumble and the flasks toppled on the worker who was using the drill.

Lack of adequate plant space, arising from expanded wartime activities, was the source of many of the poor housekeeping conditions. Similarly, lack of space was the underlying reason for many of the unsafe conditions which were classified as hazardous procedures or poor plant layout. The latter group primarily included such unsafe con-

Principal causes of accidents in the foundry industry are described in this fourth and concluding installment of an article abstracted from a forthcoming Bureau of Labor Statistics bulletin

THE FOUNDRY INDUSTRY

ditions as the placement of workers in close proximity to one another so that they interfered with each other's movements, or to the placement of operations so that the workers were exposed to the danger of being struck by cranes, crane loads, or passing vehicles.

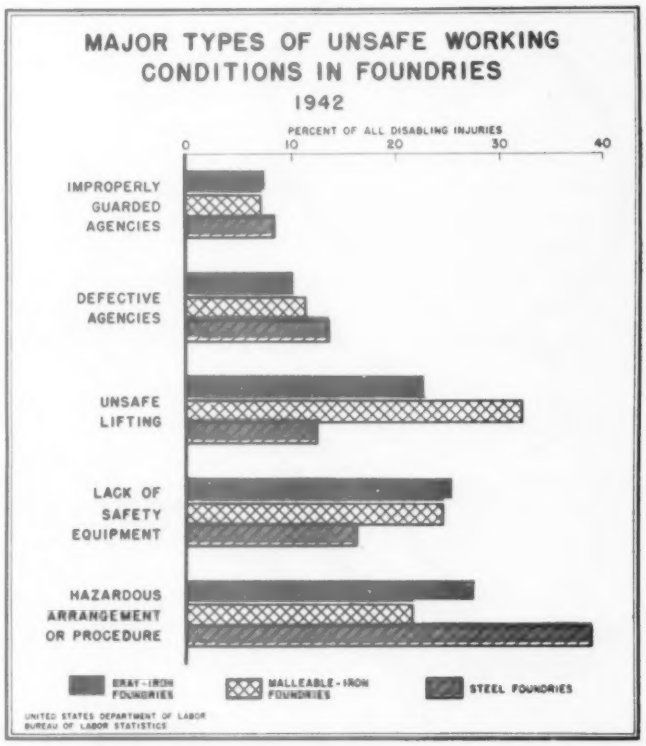
Lack of personal safety equipment—Many foundry operations involve inherent hazards which cannot be successfully eliminated or guarded at the point of operation, but which can be overcome through the use of proper personal safety equipment. In these circumstances the use of such equipment is recognized as an essential condition for the safe performance of this work, and its absence constitutes an unsafe working condition. About one in every four of the disabling injuries in the gray-iron and malleable-iron foundries, and one in every six in the steel foundries, resulted from unsafe working conditions of this type.

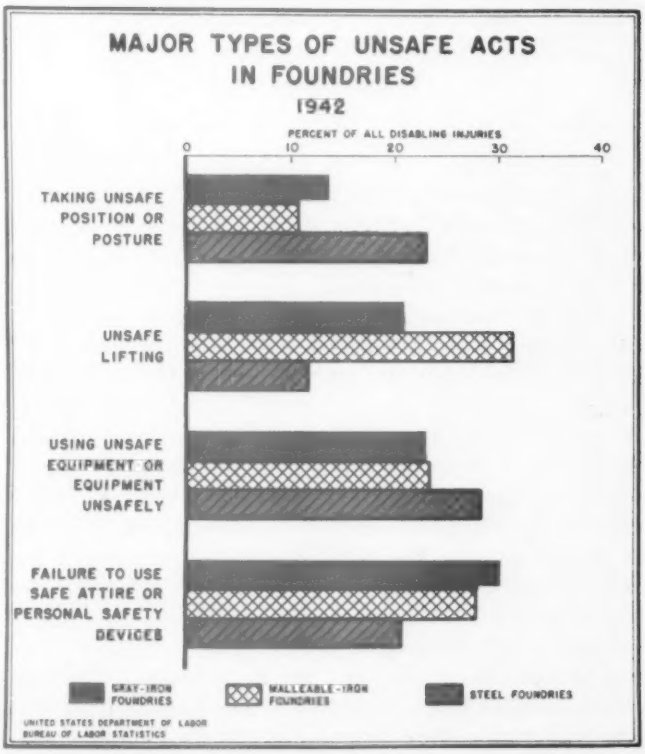
The most common unsafe condition in this group was the lack of goggles in the performance of work which presented obvious eye hazards, such as grinding, chipping, or handling molten metal. There were, however, many instances of unsafe conditions which involved a lack of other types of safety equipment, such as handling hot materials without gloves, handling molten metal without leggings or molder's shoes, handling acid or alkaline chemicals without gloves or other protective clothing, and other operations performed without specifically prescribed safety equipment.

Unsafe lifting conditions—In this category of unsafe working conditions are included accidents resulting from manual lifting of objects which should have been lifted mechanically, from individuals lifting objects which should have been lifted by a team, and from the lifting of objects in cramped or crowded quarters which should have been cleared before the operation started. In a few instances there was some question whether the injury might not have occurred because of (a) improper lifting procedure rather than because of (b) lifting excessive weight. When this question could not be specifically answered, the case was included as an unsafe lifting condition (b).

Unsafe lifting conditions constituted a much more prominent source of accidents in the malleable iron foundries than in either the gray iron or steel foundry groups. Comparatively, these unsafe conditions were involved in one out of every three of the malleable iron foundry injuries for which details were available, slightly less than one in every four of the gray iron foundry injuries, and one in every eight of the steel foundry injuries.

Unsafe conditions of this type are due primarily to inadequate supervision. In all work that involves lifting, the immediate supervisor can (*Please turn to page* 266)





Babbitt Metal in Valve Parts

Q.—We have an order for some white metal castings of the following composition: Tin 89 per cent; copper 3.5 per cent; antimony 7.5 per cent. The castings are for assembly inside a valve body casting. We shall appreciate your advice on the proper procedure for melting and fluxing this metal, also any necessary variation in gating system.

A.—The analysis you give is for standard babbitt metal, also known at one time as U. S. Navy composition *W*, an excellent material for journal bearings carrying heavy

loads, but it seems unusual to be used in a valve. You can buy the metal ready made in ingot form from any of the nonferrous metal makers, or for that matter from hardware or machinery supply houses.

If for any reason you find it necessary to make your own mixture, you have a choice of three methods: 1—First make an alloy of copper and antimony and a sufficient amount of tin to bring the melting point within the range of the babbitt kettle. The resulting alloy is known as the *hardener* and is added in the required proportion to the bath of molten tin in the kettle. 2—The copper and antimony are melted in a crucible and then in proper amount are added to the molten tin in the kettle. 3—All three ingredients are melted in the crucible. The copper is melted first. Then the antimony is added gradually and thoroughly heated. The crucible is removed from the furnace and the tin is added. The heat in the crucible will melt the tin. The babbitt then is at a suitable temperature for pouring. Of the three methods, No. 2 is recommended. No flux is needed. The shop method of testing the pouring temperature is to insert a small pine stick into the bath. When the surface of the stick is scorched, but not burned, the temperature is satisfactory. For small castings, no special gates or risers are required. The metal flows readily and the shrinkage is not abnormal.

Pattern Storage Is Discussed

Q.—We are considering the construction of a new, modern pattern storage room, and wonder if you have a typical pattern room layout which we could use. We have about 400 to 500 patterns in stock.

A.—We do not have any typical layout for pattern storage, but offer the following suggestions for your consideration. The pattern storage building may house a pattern shop on the ground floor with storage space provided on the upper floors which is serviced by outside elevator or crane facilities. Patterns made within the building are shipped to their destinations. Patterns shipped in from other sources may be checked and sent on to the respective foundries. Patterns returned from the foundry and awaiting storage are checked for missing pieces and coreboxes or necessary repairs and subsequently stored.

It may be advisable or desirable to have a building just for storage purposes. In that case it should be built near the foundry, and where a patternshop exists, the storage building may be between them, or readily accessible to both foundry and patternshop. The building may be concrete block, brick or similar construction to make it fireproof. Inclusion of windows is optional. However, natural light seldom is sufficient as it is obstructed by shelving and stored materials, and modern artificial lighting is preferred. Outlets for extension cords should be spaced conveniently to supplement overhead lighting. Window ventilation may be supplanted by air conditioning units and humidifiers. So-called heat boosters may be used in temperature control, or with the heating element shut off, for air conditioning.

A filing cabinet should be located near the entrance. Many variations of record cards are available or may be printed to meet the existing system. A good filing system aids in easy location of pattern equipment. Wood shelving increases fire hazard, and consequently, heavy wire mesh reinforced with angle iron edges and bracing is preferred. Those prevent accumulation of dust, and permit viewing patterns stored on shelves below and above the line of vision. Type of shelf storage adopted depends on the type of pattern to be stored. Matchplates of equal size may be slid in grooves or runways. Gates and matchplates may be hung overhead.

A well or alley open between shelvings is favored for large patterns. Long patterns such as rolls or cylinders as well as their coreboxes may be stood on end to save floor space. The well or alley may be open for two or more stories similar to arcade construction. A crane traveling in the center of the aisle facilitates handling of large patterns. A small chain hoist and truck aid in quick service to the foundry.

Bulk of patterns and pattern equipment still is made of kiln dried or well seasoned wood. Pattern coatings as

well as the wood construction make patterns highly flammable, and a fire hazard. The latter is met by fireproof construction of building, installation of sprinkler system, proper placing of fire extinguishers, and having a fire brigade holding periodic fire drills. Also it is advisable to carry proper fire insurance coverage.

Has Gas Holes in Brass Valve

Q.—We are sending you a small brass gate valve and three wedges showing porosity in the cope area. The regular 85-5-5-5 metal melted in a small electric furnace is made up of 28.5 per cent ingot metal, remainder our own returns including 50 pounds or 14.3 per cent machine shop chips. Metal is tapped at a temperature of approximately 2350 degrees Fahr. and deoxidized by a phosphor-copper addition, 4 ounces per 175 pounds metal. Molds are made in a natural bonded sand, permeability 18-20, green compressive strength 10-12 pounds per square inch, moisture content 5.8-6.2 per cent. We have experimented up and down the scale with temperatures, ramming densities and moisture content. Finally for no apparent reason the porosity disappeared. We shall appreciate your opinion on the probable cause and method of prevention, if it should appear again.

A.—Without more information it is difficult to advance a positive opinion on the cause of the holes. Their location would indicate probable hard ramming of the mold and this may or may not be the entire cause. If the metal was gassed the progressive cooling of the casting from the part that cools first to the part which cools last necessarily would drive the gas into that part of the casting last to cool. It is difficult to say that the metal is gassed without making a series of tests. We presume you may have made these tests which gave you the definite information that gassing did occur. However, it is quite possible that an occasional heat of good metal apparently may be thought to have been gassed when in reality the gas bubbles in the casting resulted from undue moisture in the sand, hard ramming, or a combination of such local conditions. Fracture the castings and study the appearance of the fractures. If the gas holes of a freshly fractured surface are clean and bright, then it is probable that the metal has been gassed and should have been remelted. If the inside of the bubbles show oxidation or discoloration, study both molding and melting conditions. They are jointly responsible for the trouble.

Making Hand Grenade Castings

Q.—For the past several years we have been operating a brass foundry, and recently have been asked to consider manufacture of cast iron hand grenades. We know little about cast iron, and would like information on a cupola with a capacity of probably 5 tons per 8-hour shift, flux, coke, etc. Also we would like to know the method of gating and risering, core data with type of sand, etc. We have a gas-fired tilting furnace using a No. 225 crucible. Could we melt iron in it, or could we turn it into a cupola?

A.—Since you have practically no experience with production of gray iron castings, our suggestion would be to let well enough alone by sticking to the field in which you have expert knowledge. While gray iron hand grenades look like simple castings to make, they must be produced within close tolerances on weight, length, wall thickness, and also must meet ballistic fragmentation tests. While you mention a cupola to supply 5 tons in an 8-hour shift, it should be pointed out that in the usual jobbing gray iron foundry, the procedure is to operate the cupola only in the afternoon for 2 or 3 hours and pour off the molds previously made up until the time the cupola bottom is dropped. Consequently, to melt 5 tons of iron in 2 hours a cupola lined to 24 inches would answer.

As far as the procedure for making hand grenades is concerned, a detailed description of the practice in one foundry was presented in the December, 1943 issue of THE FOUNDRY. Briefly, cast iron patterns are mounted on what might be termed a pin lift stripper machine. Cast iron flasks have a center bar, and are 23 x 27 x 3½ inches. One set of patterns is used for cope and drag molds; setting a sprue plug in the case of the cope. Thirty-two patterns are mounted on the plate in two groups of 16 each. Each group is composed of two rows of 8 patterns at right angles to the runner which terminates in a sprue. Hand molding is employed, and sand is slightly coarser than that used for stoveplate. Three wire chaplets are used in drag to support each core, and one in the cope. Cores are made in halves and "booked" in the green state; placed in driers and baked. Core boxes contain 8 impressions. The cores are vented well by use of a vent plate which leaves channels in the sand. Linseed base oil is used as bond in the ratio of 1 part oil to 45 parts sand. Cores are baked hard to give stability. Molding crew consists of molder, helper and core setter. Day's work is 80 molds for three men or 2560 grenade castings. Grenades finished weigh 17 ounces plus or minus ½-ounce so that roughly about 4000 pounds of metal are required to pour the castings.

GANGWAY!

By J. A. Patterson

"Now Shorty, make like on th' xylophone with 'Don't Fence Me In'!"

Cold Treatment Not Used on Castings

Q.—Can you give us any information on the cold treatment of gray iron castings?

A.—So far as we are aware cold treatment has not been applied to gray iron castings, and for that matter to any type of castings. The process, and by that we assume you refer to refrigeration at minus 60 to 120 degrees Fahr., has been applied to a limited degree to special high alloy steels such as used for tools in cutting and turning steel. In some instances it is reported that the life of the tools has been increased remarkably while in others no change has been observed. Opinion seems to be that beneficial results of cold treatment appear in high alloy steels which tend to contain considerable amounts of retained austenite after regular heat treatment. The cold treatment aids in transforming that compound or structure into a more desirable one such as martensite, etc. Cold treatment also has been found effective in stabilizing steels used for gages and measuring blocks.

Hollow Bushings Are Full of Porosity

Q.—We are having considerable difficulty in producing hollow bushings which range up to 47 inches long and 6 inches outside diameter, free from porosity. We have tried pouring from the top and bottom with various types of risers, and different metal compositions. We are aiming to hit at least 90 per cent copper with tin and zinc as other elements. Our crucible melting has been watched carefully to keep the crucible lip above the outgoing flue, and we remove the metal when it has reached the pouring temperature. We have used green sand, dry sand and combinations, and also use a degasifying alloy. We believe that use of the centrifugal casting process is the answer from the standpoints of obtaining the type of castings we want and low cost per bushing.

A.—Since you did not state exactly what gating procedures you employed, it is difficult to offer suggestions on possible ways of making your bushings sound. Apparently the lack of soundness is that arising from poor feeding rather than from gassed metal or insufficient venting in mold and core. Also while you mention pouring from the top and bottom, we do not know whether the mold is in the vertical or horizontal position. However, our suggestion would be to pour the bushing castings in a vertical position using a ring of pop or pencil gates about halfway between the outer and inner diameters. To supply a good feeding reservoir the casting would be made several inches longer than the final desired length, and the extra amount sawed off. The pop or pencil gates preferably should be formed in a cup-like basin of core sand which is baked well before use. We believe that ten ½-inch holes equally spaced will admit metal at the proper rate. Also due to the long drop it may be advisable to use a dry sand core at the bottom of the mold to prevent cutting.

If you prefer pouring the mold in a horizontal position, you can use the same principle as for top pouring by placing a number of slot or round gates along the upper surface which are connected to a long pouring basin. Also it might be a good idea to arrange your molding practice so that the lower surface of the pouring basin forms the top surface of the casting. In other words the pouring basin would be in the form of a core with a thickness of about 1-inch at the bottom which is set into a trapezoidal opening in the cope formed by a loose piece on the pattern. Preferably the pouring basin core is put in position before the cope is removed from the pattern to prevent breaking edges of the mold.

While previously we have assumed that the central core which forms the bore of the bushing is vented properly, and does not cause trouble, it might be well to point out that there is some possibility that the porosity you mention may be due to the core causing a slight disturbance. Our suggestion is to sweep up the core on a perforated pipe or hollow arbor and see that the open end of the arbor has a free exit to the outside of the mold and not cut off by the bottom board, for example. If you do not have the perforated pipe you can accomplish the same venting by placing a series of ¼ or ½-inch rods along the pipe, and pulling them out after the core is formed but before drying or baking. The vents formed by the rods must be led to the outside of the mold as in the case of the perforated pipe.

As far as centrifugal casting is concerned, it should be pointed out that it is not free from trouble. Equipment is expensive, and must have sufficient use to make it pay for itself. Close control of pouring temperatures and conditions are required for best results, and the equipment must be maintained in good operating condition. In other words centrifugal casting is not a cure-all, and requires experience to obtain uniform and consistent results.

Brass Ring Cracks In Iron Center

Q.—We are attempting to pour a bronze ring 3/4-inch thick around an iron casting 9 inches diameter and 1-inch thick. The metal is poured through a runner and riser. The bronze ring cracks at the riser. We shall appreciate your advice on the cause and the remedy for this condition.

A.—The cause of the trouble is the elementary fact that metal contracts in cooling. In contact with a rigid cast iron ring the bronze ring cannot contract to the full extent. Therefore, it cracks at the weakest point, that is where the last metal enters the mold through the gate and riser and as a result the temperature is somewhat higher than in the remainder of the casting. The obvious remedy is to raise the temperature of the iron ring with resulting expansion before the bronze is poured around it. Then the two rings will contract uniformly. Several methods are available for heating the inside ring.

The method adopted will depend on local conditions. 1—Form a cavity inside the iron ring and fill it with molten metal. When the iron ring is thoroughly heated, pour the bronze ring around the outside. The inner cavity may be in two or more sections to facilitate later removal and handling of the scrap metal. 2—Place a small grate in the bottom of the mold and build a charcoal fire. With a natural draft at the bottom, or a jet of air from a compressed air line, this little fire will raise the iron ring to a red heat. 3—Employ a gas or oil torch for the same purpose. 4—Heat the iron ring in any kind of an open fire. Place it in the mold immediately and pour the bronze around it. In this instance any scale or oxide on the surface of the ring must be removed by brush or blast before the ring is placed in the mold. Bronze will not lie against a scaley or oxidized surface, but will kick and boil, with resultant porosity and blowholes in the casting.

Water Jacket for Permanent Mold

Q.—Please advise us on the advisability of attaching water jackets to permanent molds for aluminum castings. We also would like further information on the material to be used, and the construction of permanent molds without cores.

A.—We do not recall any references to using water jackets on molds for aluminum alloy castings, probably due to the fact that the quantity of heat to be removed is such that it can be accomplished without resorting to water cooling. In fact the molds usually are operated at 300 to 400 degrees Fahr. to prevent cold shutting and kindred faults. Cycle of operation of the mold is such as to keep the temperature in that range. Where more rapid cooling is desired the exterior surface of the mold is increased by ribbing and pinning or studding for greater radiation, and in some cases circulation of air is increased by use of a fan.

Material used for molds generally is gray cast iron with or without alloy additions to increase heat resistance. Most important feature is proper design of molds which is gained mainly by experience or employment of one skilled in the art.

Use Wax Pattern in An Old Process

Q.—Just what is the lost wax process as applied to casting production. We shall appreciate information on the use and practicability. References would be helpful.

A.—The so called lost wax or *cire perdu* process, also known in some circles as investment molding, dates back many centuries and was employed principally in the construction of statuary and orna-

(*Concluded on page* 114)

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(*Concluded from page* 112)

mental bronze castings. As with many other terms, lost wax is not an exact translation of the original Latin *cire perdu*, which really means wax that has vanished, or that has left its original location. So long as the location of any material is known, it cannot be referred to as lost. The wax in the mold is melted out, but it is collected in a suitable receptacle under the mold and used again. The method has been employed by dentists and jewelry makers for many years under the term investment molding. In the past few years the method has been adopted in the foundry to a considerable extent in the production of small castings in plaster molds. The object is to produce castings, uniform in shape and size and within tolerances of 0.005-inch.

Briefly, the wax patterns are produced by injecting wax under pressure into a suitable mold, which may be steel, white metal, vulcanized rubber, plastic or practically any other material. The wax patterns then are placed in a suitable container and surrounded by liquid plaster. The plaster is heated to expel all moisture, and during the process the wax also melts and runs out through an opening in the bottom of the mold. The mold then is filled with molten metal. Intimate details of the process are too extensive to present in this necessarily restricted space. A fairly full description by L. L. Wyman and D. Basch was presented in the Feb. 1944 issue of THE FOUNDRY.

Thin Flat Castings Are Defective

Q.—We shall appreciate advice on how to eliminate small holes on the cope and also on the drag face of the flat, circular gray iron castings 12 inches diameter and 7/8-inch thick. These castings are machined on the rim and also on both faces to a thickness of 1/2-inch. Some of the castings are plain disks. Others have hubs on both sides, with either a green sand or a dry sand core in the center. The molds are made in snap flasks and in tight flasks, and have been gated according to several methods. The iron is made up of 40 per cent pig iron 2.25 to 2.50 per cent silicon and 60 per cent approximately half and half domestic and foreign scrap.

A.—Neither your iron composition nor your gating method is a factor of any importance. The direct cause of the small holes is a drag face on which the iron does not lie quietly. You can check this statement to your own satisfaction, by watching the behavior of the iron poured into a mold without a cope. The more or less violent boiling action is caused by steam. Some of the steam bubbles are caught and held by the skin which forms almost immediately on the bottom face of the casting. The greater part of the bubbles remain in the iron until it reaches the cope face where the bubbles are trapped by the solidifying iron in contact with the cold cope face. Any one of several causes may be responsible for the unsatisfactory drag face of the mold.

The sand may be too wet, too hard or too tight. The sand may be perfectly satisfactory, but the molding method may be faulty. Assuming that other castings made in the same kind of sand are perfect, the finger of suspicion points very strongly to a common oversight. Proper provision has not been made for the escape of steam through legitimate channels. Where the entire area of the drag face is covered with molten iron, it is apparent that the entire volume of generated steam must escape either downward through the sand or upward through the iron. The only place the steam can escape through the sand is either through a perforated bottom board, or through a number of vent passages formed with the fingers or with a wire between the bottom board and the lower edge of the drag.

Castings Is Filled With Blowholes

Q.—Under separate cover we are forwarding a piece of a small gray iron casting with a clean, smooth skin, but with the interior a mass of blowholes. Several castings from a recent heat showed this form of defect. We shall appreciate your opinion on the cause.

A.—The direct cause of the defect is steam trapped in the molten metal. Steam may have been generated from four possible sources: Wet sand in the mold; wet bottom in the cupola; wet cupola spout; or wet ladle lining. A brief checkup on these features will enable you to place your finger on the feature or combination of features responsible. In the order of probability the wet ladle lining leads the list. The steam causes the iron to boil violently and if the iron is poured into the mold in this condition, the surface in contact with the cold sand in the mold solidifies almost immediately and the steam bubbles cannot escape. The obvious remedy is to refrain from pouring metal from a ladle in which commotion is visible.

In some instances where the commotion is not too violent, and where the metal may be poured at a somewhat lower temperature than usual, the metal may be held in the ladle until it becomes tranquil. The second most probable cause is wet sand in the cupola bottom. Iron from the first tap will be impregnated with steam and the resulting castings will be filled with blowholes. Occasionally a new spout, or a spout made up in a hurry and not thoroughly dried will add steam to the stream of metal. This cause is rather remote since the amount of steam is not great, and usually has time to escape before the metal is poured into the molds. With proper supervision, wet sand has little chance to enter a mold. However, slips occur now and again and the extra steam generated fills the casting with blowholes. In rare cases, where a careful process of elimination has exonerated the foregoing four causes, the culprit has been a stump of a soldier or other piece of wood accidentally buried in the sand in contact with the pattern or the sprue and gate.

Sand Properties May Vary Considerably

Q.—We just have installed sand testing equipment and will appreciate any information you have on high and low limits for shear, crush, moisture, permeability, etc. on our sands for facing, molding, cores for gray cast iron. We have some information on the subject, but the ranges appear to be pretty wide.

A.—So far as we know there are no hard and fast rules relative to the properties of molding or core sand mixtures, and consequently, they will vary over a wide range from foundry to foundry. Molding practice is an important factor in determining desired sand properties.

As a general rule the figures set up for priorities in a particular foundry are based on past experience. In other words certain sand mixtures give satisfactory results—and the properties as determined on those mixtures are used as the base. The changes can be made on a small scale on one variable at a time until the best workable limits are established, and those are used for the standards.

Due to variations in practice from foundry to foundry you must remember that suitable sand properties for one will not necessarily apply to another, but they may serve as a guide in establishing your own practice. For example H. A. Deane in a paper available in the *Transactions* of the American Foundrymen's Association, Vol. 44, 1936 gives the following information on sand properties for gray iron castings:

"Synthetic sand for sandslinger molding on castings up to 1000 pounds—Moisture 4.5 to 5.5 per cent; permeability 80 to 100, and green compressive strength 7.5 to 8.5 pounds. Synthetic or natural sand for castings on heavy jolt strip or floor weighing from 100 to 300 pounds—Moisture 5.5 to 6.5 per cent; permeability 45 to 70; and green compressive strength 6.8 to 8.8 pounds. Natural sand for castings on bench or squeezers weighing from 1 to 100 pounds—Moisture 6 to 7 per cent; permeability 18 to 40, and green compressive strength 6.0 to 7.5 pounds.

"Facings sands for those castings are indicated to have the following properties: Castings made on sandslinger weighing from 500 to 900 pounds—Moisture 4.5 to 5.0 per cent; permeability 45 to 60, and green compressive strength 12 to 13 pounds. Castings weighing 100 to 300 pounds made on sandslinger—Moisture 4.5 to 5.0 per cent; permeability 45 to 60, and green compressive strength 8.0 to 9.5 pounds. Castings weighing 100 to 300 pounds made on jolt strip machines—Moisture 4.5 to 5.0 per cent; permeability 45 to 60, and green compressive strength 8.3 to 9.6 pounds. Castings made on bench and squeezer—Moisture 6.0 to 6.5 per cent; permeability 25 to 30, and green compressive strength 7.5 to 8.5 pounds. For small castings requiring smooth surface—Moisture 6.0 to 6.5 per cent; permeability 10 to 18, and green compressive strength 8.0 to 10.0 pounds."

It's What Users Say About the Royer Sand Conditioner that Counts! . . . .

Michigan grey iron foundry* reports—

"Since getting the machine we have noticed a vast improvement in the condition of the sand, as all shot and small pieces of iron are eliminated. In addition, the condition of the moisture is much better in the sand and it is much fluffier, produces a better finished casting, and also reduces the scrap. It practically cuts in two the time necessary for cutting the sand."

Non-ferrous founder* reports—

"The Royer has done everything we've expected and then some. Our molding sand is aerated better than ever before. It perfectly blends in the new sand as needed and is easily portable from pile to pile. We are cutting down labor time to cast, making additional labor available for shaking out, etc. We have also put our Royer to good use in the Core Department blending and mixing core sands. It requires but little of our much needed floor space."

New England silversmiths* say—

"The Royer Sand Conditioner serves our purpose very well. We use Albany and Yankee sand, and pour copper-base castings most satisfactorily."

Pennsylvania machinery manufacturer* states—

"The machine is performing satisfactorily and we are undoubtedly getting better sand conditioning, since previous to its purchase all of our sand was hand prepared."

Between the lines of these unsolicited expressions you will discover why there are more than 6,700 Royers in service. There is a Royer model and size for every foundry requirement. Send for complete Catalog No. 744.

*The names of these users will be furnished on request.

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.

KINGSTON, PENNSYLVANIA

MEN of Industry

FREDERICK A. MELMOTH

FREDERICK A. MELMOTH has resigned as vice president and director of Detroit Steel Casting Co., Detroit, because of health and personal reasons. Mr. Melmoth became associated with the company in 1930 as technical director, subsequently becoming assistant manager and vice president. Born near Sheffield, England, he received his technical training at Sheffield University, where he was awarded the associateship in metallurgy, and the Frederick Mappin medal for honors in 1913. From 1908 to 1917 he was connected with the Brown-Bayleys Steel Works, Sheffield, as assistant metallurgist and steelmaker. From 1918 to 1926 he was associated with Lake & Elliott, Braintree, England, and the National Steel Foundry, Scotland, as steel foundry manager and metallurgist. In 1926 he became foundry manager, Thomas Firth & Sons Ltd., Sheffield, which position he held until 1930 when he came to the United States and assumed his duties with Detroit Steel Casting Co. Mr. Melmoth, a member of the American Foundrymen's Association, was chairman of the Detroit Chapter of that organization in 1942-1943. He also holds membership in the American Society for Metals, the American Institute of Mining and Metallurgical Engineers, and the Institute of British Foundrymen. He was awarded a diploma of the Institute of British Foundrymen for the exchange paper which he presented at the 1939 International Foundry Congress held in London, and in 1940 he received the Joseph Seaman gold medal and life membership in the American Foundrymen's Association. Mr. Melmoth has been active in committee work of the Steel Founders Society of America and the A.F.A.

♦ ♦ ♦

FRANK E. WARTGOW

Frank E. Wartgow, for the past 2 years manager of the employes' suggestion system, American Steel Foundries, Chicago, and for 6 years prior to that in various time-study and supervisory posts at the company's Indiana Harbor Works, resigned recently to become supervisory engineer, Hasbrouck Haynes Engineers, Chicago, business consultants. Mr. Wartgow is vice president elect, Chicago Chapter, American Foundrymen's Association, which organization he served for the past 3 years as secretary.

♦ ♦ ♦

J. L. Mullin, since August, 1943 general superintendent of foundries for the American Manganese Steel Division of the American Brake Shoe Co., has been appointed vice president in charge of operations, with headquarters at Chicago Heights, Ill. Mr. Mullin has been associated with the manganese steel industry since 1914, when he joined the Edgar Allen Manganese Steel Co., forerunner of the present Brake Shoe Division, as a clerk in the annealing department, and has successively held the positions of local purchasing agent, foundry superintendent, works manager at New Castle, Del., and general superintendent of foundries.

♦ ♦ ♦

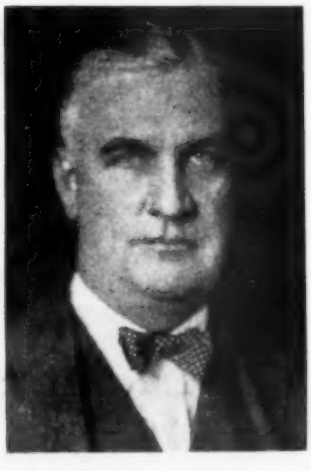
James G. Garrard, formerly vice president, has been elected president of the Ohio Malleable Iron Co., Columbus, O., and will continue his duties as general manager of the company. Mr. Garrard has been associated with the malleable industry since 1913, his company connections including the Northwestern Malleable Iron Co., Milwaukee; Terre Haute Malleable & Mfg. Co., Terre Haute, Ind.; Grand Rapids Malleable Works, Grand Rapids, Mich., and Michigan Malleable Iron Co., Detroit.

♦ ♦ ♦

Clifford McKelvey has opened an office of Lakeside Foundry Service Co. at 39 South La Salle street, Chicago 3, to specialize in sale of nonferrous castings and nonferrous metal fluxes. Mr. McKelvey formerly was associated with Chicago Hardware Foundry Co., North Chicago, Ill., as superintendent of brass and aluminum foundries, and more recently with Western Metals Co., Chicago, as sales manager.

♦ ♦ ♦

J. L. MULLIN



JAMES G. GARRARD

Thomas Robins Jr. has been elected president, Robins Conveyors Inc., Passaic, N. J., succeeding **Thomas Matchett**, president since 1928, who is retiring from an active part in the management. Mr. Robins, who has been chairman of the executive committee of the company for the past five years, is president of Hewitt Rubber Corp., Buffalo. Prior to moving to Buffalo in 1926, he was associated with Robins Conveyors for 7 years.

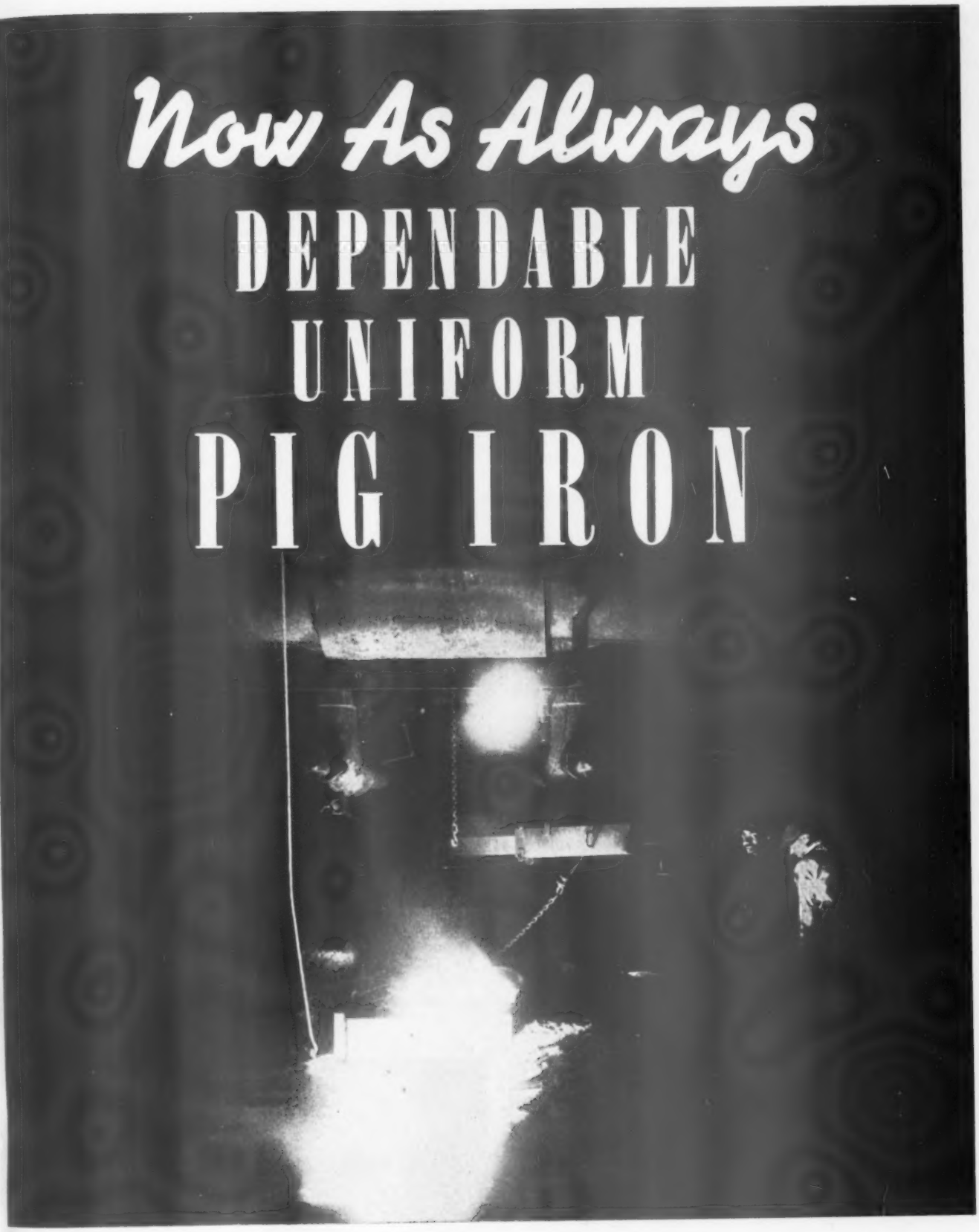
♦ ♦ ♦

Norbert K. Koebel has been appointed manager of sales, Lindberg Engineering Co., Chicago. A graduate of Ohio State University, Mr. Koebel, since 1940 has been director of

(*Continued on page* 118)

Now As Always

DEPENDABLE UNIFORM PIG IRON



WOODWARD IRON COMPANY

WOODWARD, ALABAMA

America's Largest Completely Integrated and Entirely Independent Merchant Iron Producer

INDEPENDENT SINCE 1883

(*Continued from page* 116)

research for Lindberg, in which capacity he will continue to serve. **Robert W. Dougherty,** formerly of the Chicago office, has been transferred to the Detroit sales office of the company where he will be associated with **Frank J. Condit.**

♦ ♦ ♦

William H. Martin has been appointed technical representative for the Pittsburgh area of Harry W. Dietert Co., Detroit. Mr. Martin formerly was connected with the home office of the company, devoting a major portion of his time to research problems in the laboratories. Prior to his association with the Dietert Co., he was chief radiologist, Kelsey-Hayes Wheel Co., Detroit.

♦ ♦ ♦

William N. Seese has been appointed sales and service engineer for the Michigan territory of J. S. McCormick Co., Pittsburgh. Formerly foreman of the metallurgical department, Carnegie-Illinois Steel Corp., Johnstown, Pa., he had many years' experience in heat treating and testing iron and steel castings.

♦ ♦ ♦

Benjamin F. Courtright, recently superintendent of the metallurgical and inspection department, Wisconsin Steel Division, International Harvester Co., Chicago, has been appointed sales manager to succeed **O. F. Seidenbecker,** who has resigned.

♦ ♦ ♦

John J. Watson has been transferred to the Detroit sales office of the C. O. Bartlett & Snow Co. A graduate of Case School of Applied Science, Mr. Watson had been in the home office of the company at Cleveland, in the engineering, sales and service departments.

♦ ♦ ♦

Andrew S. Coulter has been appointed manager of the Buffalo territory for the sale of core oil and allied products produced by the Werner G. Smith Co., Cleveland. He succeeds **Milton S. Finley** who retired April 15. Mr. Coulter is a graduate of the University of Pittsburgh, and before joining the Werner G. Smith Co., he was connected with the Crown Cork & Seal Co., Baltimore, as metallurgist, and later as a metallurgical engineer with James H. Herron Co., Cleveland. Mr. Coulter is rounding out 17 years of service with the Werner G. Smith Co. On Feb. 1, 1928, he was given charge of research and core oil development work at Cleveland, which position he held for 3½ years. He was then placed in charge of the Chicago office, and after 2½ years returned to the home office in Cleveland as head of the statistical department, which position he held at the time he left for Buffalo.

ANDREW S. COULTER

MILTON S. FINLEY

Milton S. Finley, retired manager of the Buffalo territory, developed an interest in the foundry industry in his youth through association with his father who was treasurer of the old, original Howard Iron Works of Buffalo. He was a pioneer in the development and sale of core oil, having spent his entire business career in the sale of this commodity. Prior to joining the Werner G. Smith Co., as vice president, when this company was organized in 1914, he worked successively for the Peterson Core Oil Co., Chicago, and Spencer, Kellogg & Sons Co., Buffalo. It is believed that through these connections he is, in continuity of service, one of the oldest salesmen in the core oil industry.

♦ ♦ ♦

Leon Bristol, formerly associated with Oberdorfer Foundries Inc., Syracuse, N. Y., has been appointed representative for E. J. Woodison Co., Buffalo, N. Y., succeeding the late **J. Ray Mathews.**

♦ ♦ ♦

Matt Koener has been appointed chief inspector for Caterpillar Tractor Co., Peoria, Ill., succeeding **M. D. Johnson,** resigned.

♦ ♦ ♦

Robert H. Rehm, who has been connected with the sales force of Whitehead Bros. Co. in New England for the last 15 years, will resign from the company July 1.

♦ ♦ ♦

J. C. Hamilton has been appointed service engineer in Chicago and surrounding territories for H. K. Porter Co. Inc., Pittsbugh, with headquarters at 332 South Michigan avenue. Mr. Hamilton formerly was with the sales department of Pittsburgh Equitable Meter Co.

♦ ♦ ♦

Fred Grotts has resigned as president of the Fort Pitt Steel Casting Co., McKeesport, Pa., an office he had held since 1938. Mr. Grotts went to Fort Pitt from Chicago Steel Foundry Co., Chicago,

(*Continued on page* 122)

WILLIAM H. MARTIN

WILLIAM N. SEESE

BENJAMIN F. COURTRIGHT

JOHN J. WATSON

THE LAST *DROP* IS AS GOOD AS THE FIRST

Ask the Men Who Use It!

A GRINDING QUESTION

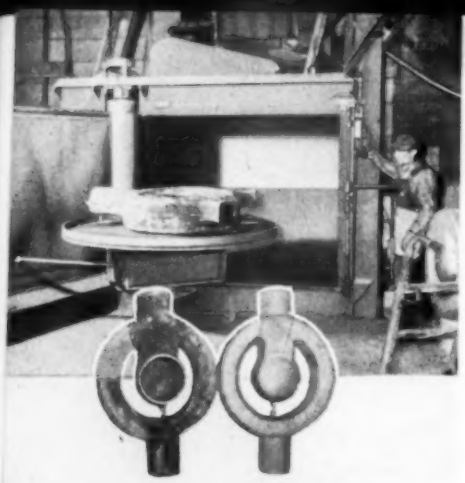
What's the use of spending a lot of money for the best foundry equipment if you don't use the BEST core oil you can buy? You don't take chances with DAYTON Core Oil! This dependable, uniform, unvarying quality oil assures you of 100% efficiency in the core room. Let the trained DAYTON OIL Service man give you the benefit of his long experience.

The

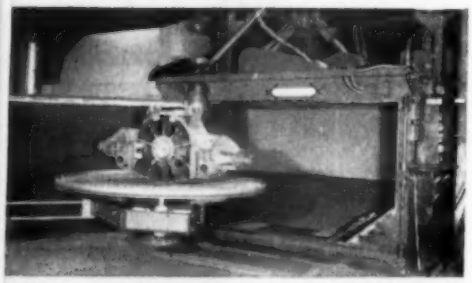
DAYTON OIL COMPANY

DAYTON 1, OHIO

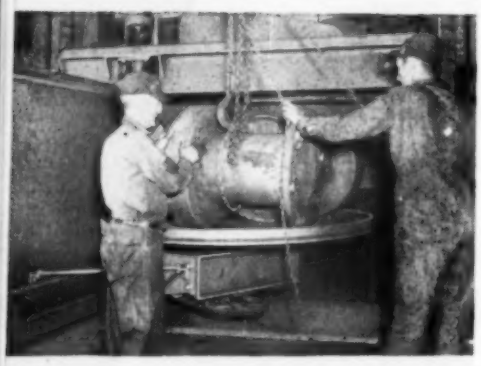
STEEL CORE AND MOLD WASHES - BINDER AND CORE PASTE - CORE WASHES - CHILL COATINGS



Practically the entire production of furnace castings made by The Premier Furnace Co., Dowagiac, Michigan is cleaned in this 66" Wheelabrator Swing Table. Three castings of the type shown above formerly required four hours to clean by tumbling . . . . the Wheelabrator now cleans these castings in only two minutes per side.



Link Belt Ordnance Co., Chicago, uses this 86" Wheelabrator Swing Table for cleaning large parts for anti-aircraft and howitzer gun carriages in approximately one-fifth the time formerly required by hand blasting in a large airblast room.



A 66" Wheelabrator Swing Table used by Ottumwa Iron Works, Ottumwa, Iowa for cleaning steam drum winches, electric hoist castings and miscellaneous gray iron castings.

This machine eliminated considerable hand cleaning in their airblast room and replaced a large tumbling mill which had been operated 24 hours a day. Cleaning time has been reduced to 8 minutes per table load (both sides). Cleaning costs have been cut 25%.

IT'S NEW!

Another important blast cleaning development in a long list of engineering accomplishments has been pioneered by AMERICAN—it's the *NEW* Wheelabrator Swing Table.

This is a versatile general purpose blast cleaning machine designed for the shop that needs moderately priced equipment capable of handling a wide range of large and small pieces where the daily production does not warrant the purchase of several different types of cleaning equipment.

The speed and economy of the airless Wheelabrator makes the Swing Table an ideal unit for cleaning large, intricate pieces that normally would have to be laboriously blasted in an airblast room.

Supplied with 24", 66", 72" and 86" Diameter Tables

THE 24" SWING TABLE is equipped with a 12" diameter Wheelabrator. It is practical for light cleaning applications. The operating load capacity is approximately 350 lbs.

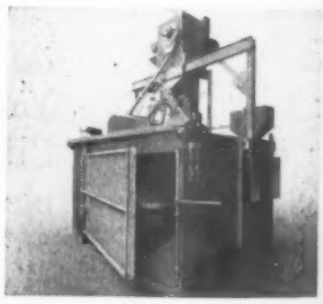
THE 66" SWING TABLE has a 19-1/2" diameter Wheelabrator. It will handle the majority of jobs that can be accommodated on a 66" diameter table. The operating load capacity is 1500 lbs.*

THE 72" SWING TABLE is a heavy duty machine equipped with two 19-1/2" diameter Wheelabrators mounted to give the work table complete blast coverage. The table has an operating load capacity of 1500 lbs.*

THE 86" SWING TABLE is the largest heavy duty machine. It is equipped with two 19-1/2" diameter Wheelabrators to provide complete blast coverage. The table will accommodate work weighing up to 1500 lbs.*

*Work ranging up to 5000 lbs. can be handled by equipping the machine with special support rollers at extra cost.

The Smallest Wheelabrator Swing Table (Has 24" Diameter Work Table)



The Largest Wheelabrator Swing Table (Has 86" Diameter Work Table)

GENERAL SPECIFICATIONS

MACHINE	24"	66"	72"	86"
Size of Work Table	24"	66"	72"	86"
No. of Wheelabrator Units	1	1	2	2
Total H.P. Requirements	5-3/4 HP	21-3/4 HP	42-3/4 HP	42-3/4 HP
Floor Space Width	6'	10'	10'8"	11'2"
Floor Space Depth	4'11"	7'6"	11'0"	12'0"
Height	10'0"	16'0" Plus 1'6" Pit	16'4" Plus 3'6" Pit	17'0" Plus 3'9" Pit
Ventilation Requirements C.F.M.	800 CFM	2000 CFM	3000 CFM	3000 CFM
Clearance Required at Front for Swinging Table	4'	6'6"	7'0"	8'0"

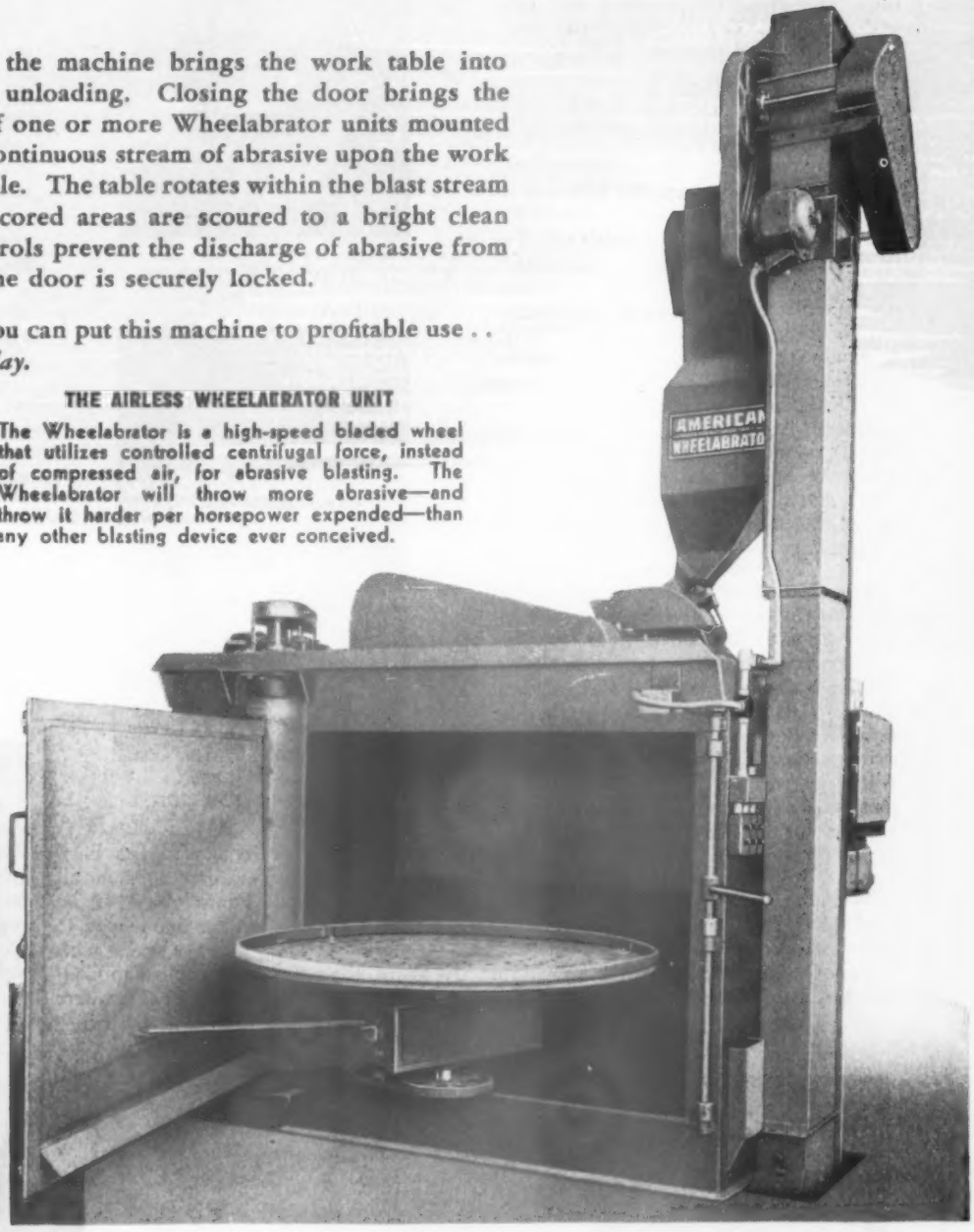
THE WHEELABRATOR
Swing Table

Opening the door of the machine brings the work table into position for loading or unloading. Closing the door brings the table beneath the blast of one or more Wheelabrator units mounted overhead which pour a continuous stream of abrasive upon the work to the full width of the table. The table rotates within the blast stream so that all surfaces and cored areas are scoured to a bright clean finish. Interlocking controls prevent the discharge of abrasive from the Wheelabrator until the door is securely locked.

Let us show you how you can put this machine to profitable use . . Write for full details *today.*

THE AIRLESS WHEELABRATOR UNIT

The Wheelabrator is a high-speed bladed wheel that utilizes controlled centrifugal force, instead of compressed air, for abrasive blasting. The Wheelabrator will throw more abrasive—and throw it harder per horsepower expended—than any other blasting device ever conceived.



THE FOUNDRY IS A GOOD PLACE TO WORK

American
FOUNDRY EQUIPMENT CO.

505 S. BYRKIT ST. MISHAWAKA, INDIANA

(*Continued from page* 118)

where he had been vice president and works manager. Previously he had served in executive capacities with Caterpillar Tractor Co., Peoria, Ill., American Steel Foundries, Granite City, Ill., and Continental Roll & Steel Foundry Corp., East Chicago, Ill.

♦ ♦ ♦

Fred C. Boyce has been re-elected president, D. J. Murray Mfg. Co., Wausau, Wis. Other officers elected were: Vice president, **M. P. McCullough,** Chicago; executive vice president and general manager, **C. E. Staky;** secretary, **A. W. Plier;** and treasurer, **J. S. Alexander.**

♦ ♦ ♦

George B. Michie has been elected vice president in charge of sales, Electro Refractories & Alloys Corp., Buffalo. Mr. Michie joined the company in 1931 and for 10 years had charge of the alloys division, which he instituted. For the past 5 years he has been in charge of purchasing and priorities. Previous connections include Niagara Falls Smelting & Refining Corp., Buffalo, Alloys & Products of New York City, and International Motor Co., New Brunswick, N. J. He is chairman of the Buffalo chapter of the American Society for Metals, a member of the American Institute of Mining and Mechanical Engineers and of Western New York Chapter of the American Foundrymen's Association.

♦ ♦ ♦

John F. Schnur has been appointed as an industrial consultant on Donald Nelson's Mission to China. For the ten months preceding this appointment Mr. Schnur was superintendent, McLean Iron Works, Palatka, Fla. Prior to that he represented the Standard Oil Co. of Indiana in Casper, Wyo., for 14 years, after which he was sent to Aruba, West Indies, where he was superintendent of the foundry for the Standard Oil Co. of New Jersey for 12 years.

♦ ♦ ♦

William F. Ball has been appointed field service manager of the sales department, Wood Shovel & Tool Co., Piqua, O. Mr. Ball is well known in the hardware distributing and industrial supply industries, having been associated with hardware jobbers in New York state, the C-K-R Co., and the American Fork & Hoe Co., Cleveland.

HENNING A. FORSBERG

J. EDWIN JOHNSON

Henning A. Forsberg, who has been appointed manager of operations of all works of Continental Foundry & Machine Co., East Chicago, Ind., as announced in THE FOUNDRY for May, started with Hubbard, the name then applied to Continental's Chicago Works, in 1915, where he did general office work. He is chairman of the District Operating Group of the Steel Founders' Society of America and is a director of the Chicago Chapter of the American Foundrymen's Association. **J. E. Johnson,** who succeeds Mr. Forsberg as general superintendent of the Chicago Works, joined Hubbard as a patternmaker in 1922, later was assistant foreman, and from 1937 to 1944 was assistant to the general superintendent. Prior to his latest promotion he served as sales engineer.

♦ ♦ ♦

Frank P. Rhame has been elected president and general manager, the Lunkenheimer Co., Cincinnati. **Homer E. Lunken** succeeds Mr. Rhame as first vice president, and will continue as assistant general manager. **Harry A. Burdorf** has been named vice president in charge of sales, **Charles Burrage,** secretary, and **Chester C. Isekeit,** treasurer and controller. Directors are Harry A. Burdorf, Henry G. Frost, Chester C. Isekeit, Carl M. Jacobs, Edmund P. Lunken, Homer E. Lunken, and Frank P. Rhame.

♦ ♦ ♦

Harold W. Wheeler has been appointed personnel director, Superior Foundry Co., Cleveland. Mr. Wheeler was formerly a member of the personnel department of National Bronze & Aluminum Foundry Co., Cleveland, and served in the labor relations, safety and welfare departments of that company.

♦ ♦ ♦

C. G. Cox has been appointed to the executive staff of Joshua Hendy Iron Works, Sunnyvale, Calif., as administrative assistant to A. A. Browne, manager of engineering and sales. Mr. Cox was formerly vice president and general manager, Enterprise Engine & Foundry Co., San Francisco.

♦ ♦ ♦

George Spatta, recently executive vice president, has been elected president, Clark Equipment Co., Buchanan, Mich., succeeding the late Albert S. Bonner. Mr. Spatta went to the Clark organization from the General Electric Co. in 1927, serving successively as development engineer, chief engineer, and

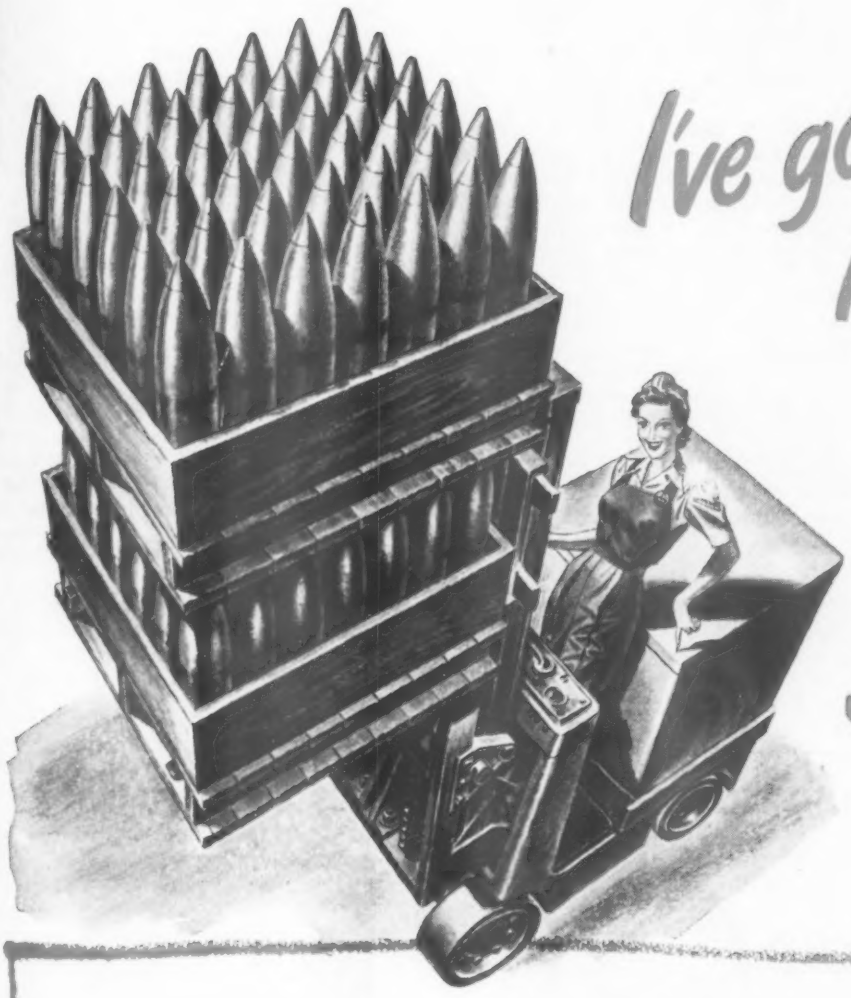
(*Concluded on page* 124)

FRED C. BOYCE

GEORGE B. MICHIE

JOHN F. SCHNUR

WILLIAM F. BALL



I've got a Philco in here...

a Philco "Thirty"— the Electric Truck Battery with

30% Longer Life!

FOR 50 YEARS PHILCO HAS BEEN A LEADER IN INDUSTRIAL BATTERY ENGINEERING

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In the new Philco "Thirty" Storage Battery, a revolutionary new construction principle employing fabricated glass tape insulation, greatly increases the life of the power-producing positive plates. Only Philco "Thirty" has this great new development which adds 30% and MORE to Storage Battery life.

FOR THE LATEST IN MODERN BATTERY DESIGN . . . SPECIFY

PHILCO Storage Batteries

PHILCO CORPORATION • STORAGE BATTERY DIVISION • TRENTON 7, NEW JERSEY

(*Concluded from p. 122*)

general manager. **Dr. Leo Wolman,** professor of economics at Columbia University, has been elected a director. **Dr. John M. Clark** of the DuPont Co., Wilmington, Del., now a director, has been elected to the executive committee. **John G. Mack** has been elected a vice president and director.

• • •

Clarence H. Cline, until recently works manager, Cooper Alloy Foundry Co., Hillside, N. J., has been appointed works manager, Malcolm Foundry Co. Inc., Newark, N. J. Previous connections include Continental Roll & Steel Foundry Co., East Chicago, Ind.; Le Tourneau Co. of Georgia, Toccoa, Ga.; Fort Pitt Steel Casting Co., McKeesport, Pa., and the Duraloy Co., Scottdale, Pa.

• • •

L. P. Schrubey, accounts service department, Ampco Metal Inc., Milwaukee, has been appointed field representative of the field engineering office, Newark, N. J. **W. F. Taff,** formerly of the Newark office, has been appointed field representative of the Cincinnati office. **Baxter Schroeder** of the Cincinnati office has been transferred to Milwaukee as field engineer for the Ampco-Trode department.

• • •

Lester B. Knight has been honorably discharged from the U. S. Naval Reserve, where he had served since 1943 as lieutenant commander with the Bureau of Ships. Mr. Knight's duties with the Navy included the supervising of modernization programs at various Navy Yard foundries. Recently he served as a member of the Industrial Survey Division, which made an extensive survey of foundry, pattern and forge shop facilities of East coast yards. Formerly vice president and sales manager of National Engineering Co., Chicago, Mr. Knight plans to engage in consulting engineering practice on foundry management and operations, with offices in Chicago.

• • •

John A. Goundrey, formerly production manager, tank division, Federal Machine & Welder Co., Warren, O., has been appointed works manager, Diamond Iron Works Inc., and the Mahr Mfg. Co. Division, Minneapolis.

Edward W. McDonald, manager of sales engineering, Griffin Wheel Co., Chicago, was honored April 14 at a testimonial dinner at Hotel Continental, Chicago, for completing 50 years' service with the company.

• • •

Dr. Zay Jeffries, vice president in charge of the chemical department, General Electric Co., Cleveland, was awarded the Clamer medal of the Franklin Institute, Philadelphia, on April 18, for meritorious contributions to the science of metals.

• • •

M. C. Pecsok, formerly sales manager of the Brush Division, Osborn Mfg. Co., Cleveland, has been elected vice president. Mr. Pecsok became associated with the company in 1912 as a cost clerk.

• • •

David E. Jenkins Jr. has been appointed assistant manager of sales, Tate-Jones & Co. Inc., Pittsburgh, manufacturer of industrial furnaces and heat treating equipment.

STEEL FOUNDRYMEN HONORED FOR CONTRIBUTIONS TO INDUSTRY

CLAUDE L. HARRELL

EDWIN A. WALCHER

OLIVER E. MOUNT

AT THE annual meeting of the Steel Founders' Society of America held at Chicago, May 18, three members were honored for outstanding contributions to the steel casting industry during 1944.

Oliver E. Mount, vice president, secretary and treasurer, American Steel Foundries, Chicago, and retiring president of Steel Founders' Society of America, was accorded recognition for his outstanding record during the past 3 years. He was presented with an engrossed and illuminated parchment scroll setting forth resolutions of the board of directors expressing deep appreciation for his services on behalf of the industry.

Claude L. Harrell, vice president, Sterling Steel Casting Co., East St. Louis, Ill., and chairman of the Steel Castings Industry Advisory Committee to the Office of Price Administration, was presented the Frederick A. Lorenz Memorial Medal for 1944. This gold medal is awarded to the individual adjudged by the board of directors to have made the most outstanding contribution to the general welfare of the industry during the preceding year.

Edwin A. Walcher, vice president, Ohio Steel Foundry Co., Lima and Springfield, O., was presented with the newly created Technical and Operating Medal of the society for 1944. This medal, which was established in late 1944, is awarded annually to the individual adjudged by the board of directors to have made the most outstanding contribution toward the advancement of the technical and operating development of the industry during the preceding year. It was wrought by the well-known sculptor, Walter A. Sinz. On the obverse side are objects and scenes emblematic of the technical and operating phase of the industry. The reverse side is similar to that of the Lorenz Medal and is also struck in solid gold.

This award was made to Mr. Walcher for the demonstration of foundry technique employed in the development of cast steel breech rings for field, naval and aircraft ordnance. These rings were cast in steel to exceed the government's most rigid requirements and broke a bottleneck which was occasioned by the inability of the previous method of manufacture to fulfill the demand. Mr. Walcher prepared an elaborate exhibit showing the various steps taken in solving the technical problems involved in producing cast steel breech rings and made the entire record available to the industry for the benefit of all.

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ANNOUNCES

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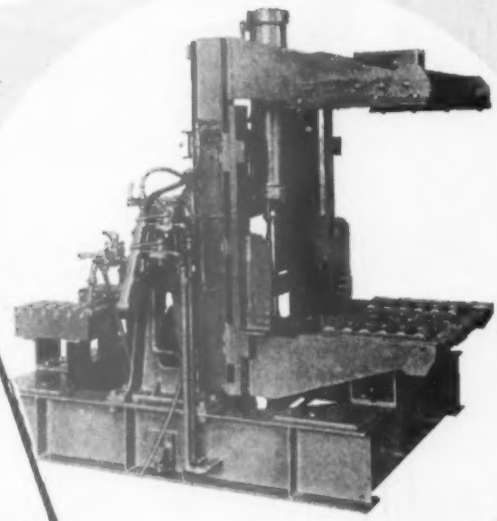
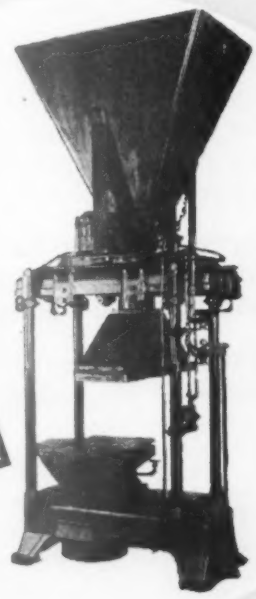
★ Pacific Graphite Works has all foundry supplies and now offers this additional service to all foundrymen on the Pacific Coast.

★ Add to the efficiency of your plant . . . get details about the International Molding Machine line.





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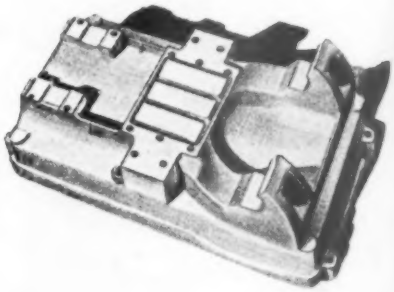

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So turn to magnesium . . . and turn to Dow for Dowmetal Magnesium Alloys. These *quality* materials, produced to meet a wide variety of property requirements, have been developed over the years for their strength, toughness, machinability, corrosion resistance, thermal conductivity and adaptability to fabrication processes.

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GRAY IRON CASTINGS FOR PRESSURE-CONTAINING PARTS FOR TEMPERATURES UP TO 650 FAHR.

(From American Society for Testing Materials Tentative Specifications A 278-44T)

SCOPE

1. These specifications cover three classes of gray iron for castings suitable for pressure containing parts, primarily for use at temperatures between 450 Fahr. and 650 Fahr.*, but also suitable for use at lower temperature.

MANUFACTURE

2. (a) The melting procedure shall be optional with the foundry.

(b) Castings and test bars shall be stress-relieved by placing them in a suitable furnace at a temperature not exceeding 400 Fahr. The heat treating charge shall be uniformly heated to a temperature of not less than 900 Fahr. nor more than 1050 Fahr. Castings shall be held above 900 Fahr. for not less than 1 hour nor more than 2 hours per inch of thickness of the thickest section. The heating and cooling rates shall be uniform and shall not be more than 400 Fahr. per hour for castings of 1 inch maximum section, nor more than 400 Fahr. divided by the maximum thickness in inches for thicker castings.

TENSILE STRENGTH CLASSIFICATION

3. Gray iron castings conforming to these specifications shall be known and listed by classes (Notes 1, 2, and 3), according to the following minimum requirements as to tensile strengths of test bars:

Class	Tensile Strength min., psi.
No. 40	40,000
No. 50	50,000
No. 60	60,000

TEST BARS

4. Test bars shall be cast separately from the casting. Three sizes of test bars are available under these specifications, as shown in Fig. 1 (Note 4). Tension test specimens shall be machined from the test bars to the dimensions shown in Fig. 2.

CORRELATION OF TEST BAR AND CASTING

5. (a) The manufacturer and the purchaser shall agree upon the controlling section of the casting. Then the corresponding test bar shall be used as follows:

Controlling Section of Casting, in.	Test Bar	Nominal Diameter of Test Bar as Cast, in.
0.50 and under	A	0.875
0.51 to 1.00	B	1.20
1.01 to 2.00	C	2.00
Over 2.00	Test bar C may be used or a larger test bar may be used by agreement between the manufacturer and the purchaser.	

(b) The correlation in Paragraph (a) is only approximate and may need modification for complicated castings. The test bar size for a given casting may then be determined by agreement between the manufacturer and the purchaser.

(c) When the controlling section is very heavy in comparison to other sections of the casting and if maximum strength is sought in the controlling section, it is posible that chilled spots may be found in the light sections. In such cases it may

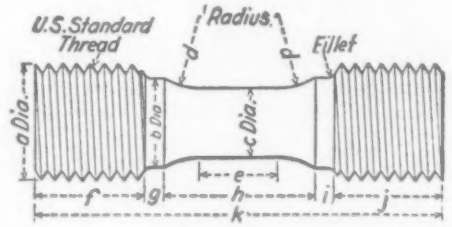
Test Bar	Dimensions Diameter, in.	Dimensions Length, in.
A	0.875	15
B	1.20	21
C	2.00	27

Fig. 1—Typical test bars

be necessary to (1) use a lower strength class for the controlling section, or (2) modify the design to provide more section uniformity.

MOLDING AND POURING TEST BARS

6. Unless otherwise agreed upon by the manufacturer and the purchaser, test bars shall be made under the same sand conditions as the castings (Notes 5



Dimension	Dimensions of Tension Test Specimens, in. Specimen A	Specimen B[3]	Specimen C
a	¾	1½	1⅞
b	⅝	1¼	1⅜
c	0.505	0.750	1.25
d	1.00	1.00	2.00
e°	Shall be equal or greater than c (diameter)		
f	1.00	1.00	1¾
g	0.25	0.25	⅜
h, min.	1.25	1.50	2¼
i	0.25	0.25	⅜
j	1.00	1.00	1¾
k, min.	3.75	4.00	6⅜

°Length of parallel.

Fig. 2—Tension test specimens machined from typical test bars

GRAY IRON CASTINGS FOR PRESSURE-CONTAINING PARTS FOR TEMPERATURES UP TO 650 FAHR.

(From American Society for Testing Materials Tentative Specifications A 278-44T)

and 6). The bars shall be poured from ladles of iron used to pour the castings. The test bars shall receive the same thermal treatment as the castings, and during the process, the test bars shall be treated adjacent to the castings they represent.

TENSILE STRENGTH TEST PROCEDURE

7. Tension test specimens (Fig. 2) shall fit the holders of the testing machine in such a way that the load shall be axial. The use of self-aligning shackles is recommended (Note 7). After reaching a stress equivalent to 15,000 pounds per square inch, the speed of the moving head of the testing machine shall not exceed ⅛ inch (0.125 in.) per minute.

NUMBER OF TESTS

8. (a) The manufacturer shall prepare and furnish all test bars as agreed upon. Two or more test bars shall be cast.

(b) If a faulty or unsound test bar gives a result not in accordance with these specifications, the result shall be disregarded and another test made.

RETESTS

9. In case of failure of a test specimen to conform to these specifications, two retests shall be made. If either retest fails, the castings shall be rejected.

CHEMICAL COMPOSITION

10. (a) It is the intent of these specifications to subordinate chemical composition to physical properties except that the iron shall have a maximum carbon content equivalent (Note) of 3.8 per cent. All irons may be alloyed in order to stabilize the structure for elevated temperature service (Note 8).

NOTE—This carbon content equivalent is calculated as follows: Carbon + 0.3 (Silicon + Phosphorus).

(b) It is recommended that embrittling impurities be held to the following maximum limits:

Phosphorus, max., per cent	0.25
Sulfur, max., per cent	0.12

WORKMANSHIP AND FINISH

11. The castings shall be true to pattern and free from injurious defects. Surfaces of the castings shall be free from burnt-on sand and shall be reasonably smooth. Runners, risers, fins and other cast-on pieces shall be removed. In other respects the castings shall conform to whatever points may be especially agreed upon between the manufacturer and the purchaser.

MARKING

12. Pressure-containing castings made in accordance with these specifications shall be marked with the name of the manufacturer, the class of iron from which the castings were poured, and the specification number "ASTM A 278."

(To be concluded)

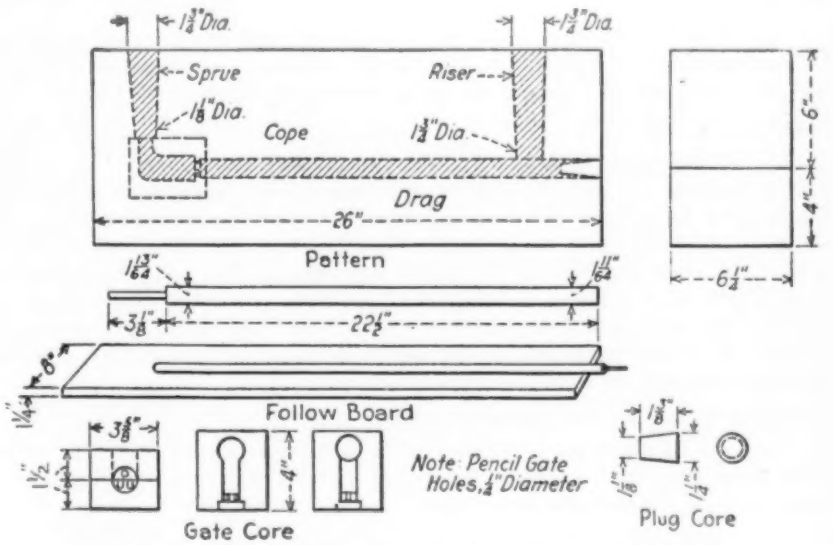


Fig. 3—Typical test bar, 1.20-inch diameter, cast horizontally

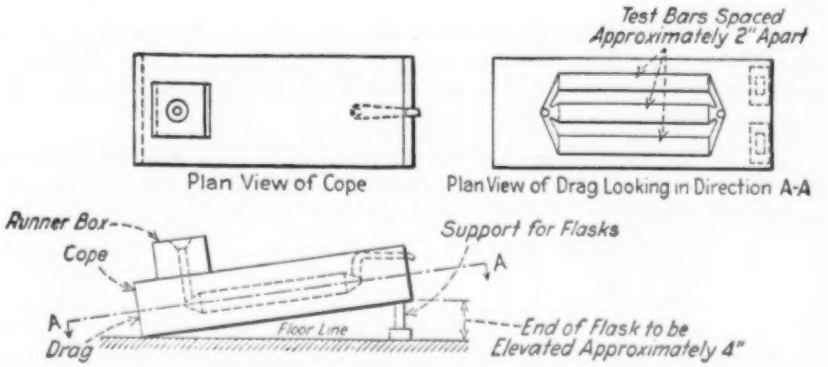
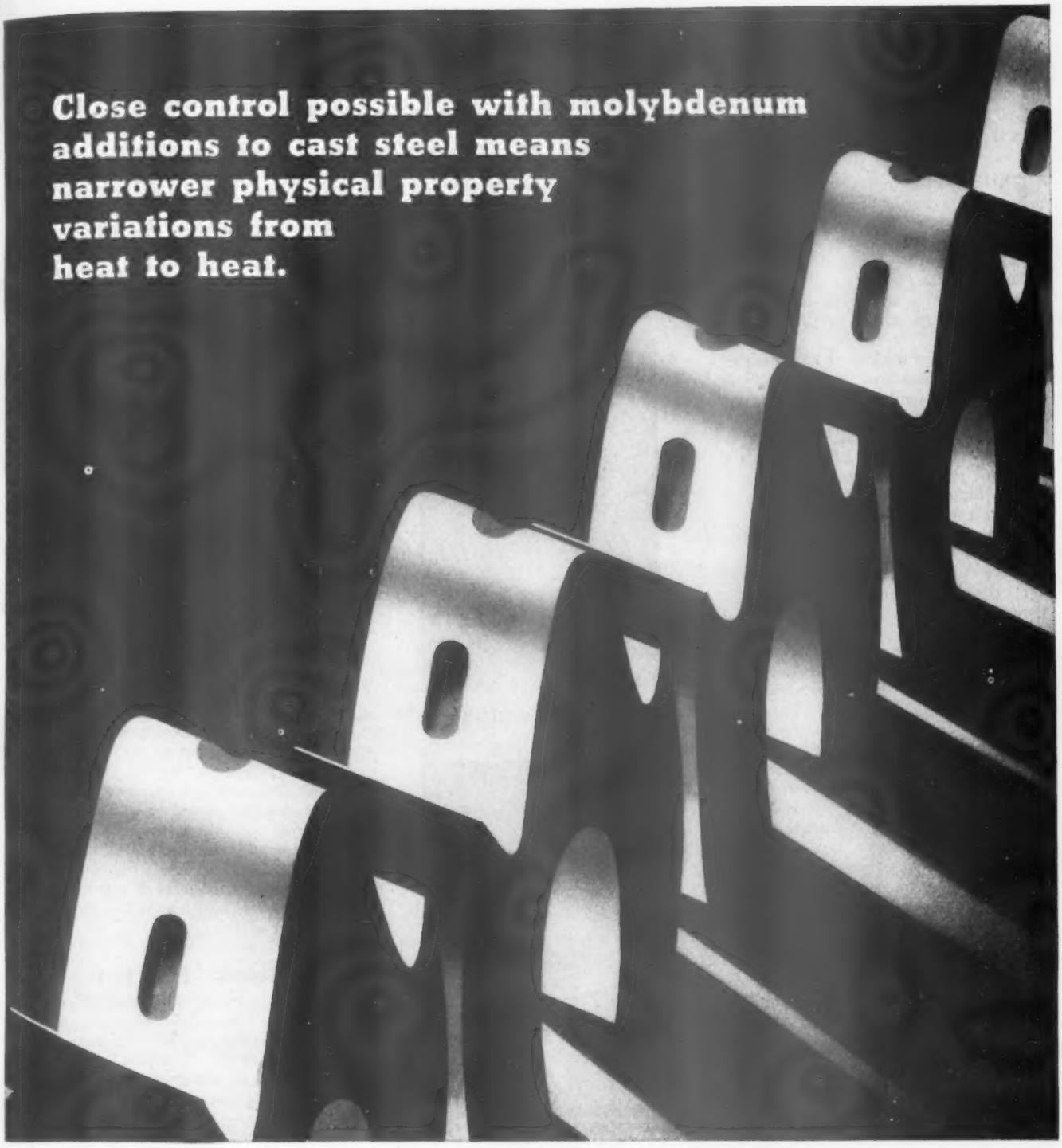


Fig. 4—Test bar cast on incline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MOLY

NONFERROUS FOUNDERS

Hold Annual Meeting

THE Non-Ferrous Founders' Society, organized in 1942 for the purpose of providing a common meeting ground for brass, bronze and aluminum foundries in evaluating and finding solutions for their industry problems, last month ended its administrative year with its annual meeting held in Detroit.

Starting with a nucleus of 22 foundries in the midwestern area, the society has expanded its membership to near the 300 mark, comprising foundries from the Atlantic to the Pacific and into the deep South. At present, the 19 directors on the board represent every district in the United States. At the recent annual meeting, it was determined that Canadian companies are also eligible to membership.

At the conclusion of the Detroit meeting, Edwin W. Horlebein was elected president of the society for the ensuing administrative year. Mr. Horlebein, one of the early founders of the organization, is president of the Gibson & Kirk Co., Baltimore, and also serves on the OPA Advisory Committee on Brass and Bronze Foundries. He has long been identified with the activities of the American Foundrymen's Association. His elevation to the presidency of the N.F.F.S. comes as a tribute for constructive work on both the executive committee and the board of directors of the association. Previously he had occupied the position of vice president of the society.

Reports Considerable Progress

Thomas S. Hemenway, president of Metal & Alloy Specialties Co. Inc., Buffalo, was elected vice president. Likewise a member of the board of directors and the executive committee, he has been chairman of the membership committee during the past two years.

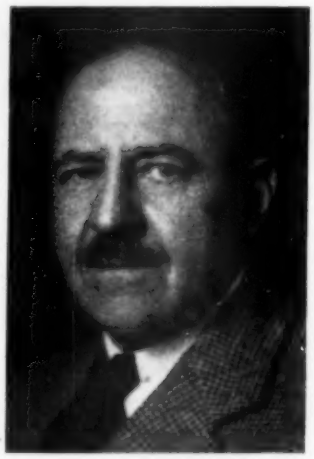
Retiring President Roy M. Jacobs, Standard Brass Works, Milwaukee, remains on both the board of directors and the executive committee. Mr. Jacobs likewise has been active as a member of the A.F.A. board and in the Milwaukee Chapter.

In his annual report, Mr. Jacobs brought out the splendid progress made by the society during the past year. Membership increased over 40 per cent; several additions were made to the headquarters staff; 13 meetings were held during the year and the seven functioning committees contributed much to the good thinking of the industry.

Considerable interest centered around the new cost manual just off the press, "Simplified Accounting Procedure and Cost Methods." This much needed book, in simple language depicts the steps necessary to set up a primary set of books for a nonferrous foundry, thus providing the means for accumulating necessary costing information. It was announced that copies of this book had been mailed to all members of the society, and it will be made available to nonmembers, suppliers and other interested parties at a nominal cost.

Additional constructive committee reports and actions, indicating industry progress, were presented by A. M. Cadman, Pittsburgh, chairman of the Committee on Tests, Regulations and Aluminum Castings; Mr. Hemenway on Aluminum Specifications; C. H. Stokesbury, Connecticut, on Trade Methods; Membership by Mr. Hemenway, and Society Activities by A. E. Pye, secretary-treasurer.

EDWIN W. HORLEBEIN



THOMAS S. HEMENWAY

During the coming administrative year, the association is giving serious consideration to additional expansion in its program.

Improved procedures in costing methods will be offered to the members of the society. A group of prominent founders were assigned the preparatory job of developing a book on nonferrous castings which, when completed, will be distributed to buyers. Consideration was given to a study of production planning methods toward the elimination of bottlenecks, and involving modern plant layout; job evaluation, labor relations and an educational program to attract the most desirable type of personnel to the nonferrous plants.

Five directors were elected by mail ballot from their areas to fill expiring directorships in these districts as follows:

District No. 3 — Fred Haack, Jr., Capital Brass & Aluminum Co., Chicago; district No. 5—F. S. Wellman, Wellman Bronze & Aluminum Co., Cleveland; district No. 9—O. W. Swangren, Dorchester Brass & Aluminum Foundry, Hyde Park, Mass.; district No. 14—F. A. Mainzer, Pacific Brass Foundry of San Francisco, San Francisco; district No. 15—Chas. Wegelin, Dixie Bronze Works, Birmingham, Ala.

Following usual practice, an evening cocktail and dinner party was held with regional founders in the Detroit area. E. W. Horlebein, as chairman of that session, spoke on the work of the OPA Industry Advisory Committee. Frank G. Steinebach, editor, THE FOUNDRY, congratulated the group on the industry progress it had made. L. M. Zimmerman, cost consultant, outlined the functions of the new cost manual. Other speakers from the board gave the audience a clear conception of committee operations.

Chicago headquarters staff attending the Detroit annual meeting consisted of A. E. Pye, secretary-treasurer; H. J. Evans, assistant secretary; L. M. Zimmerman, cost consultant, and James Wolfe, field representative. W. V. Brumbaugh is the Washington, D. C., representative.

Pittsburgh was selected for the next board meeting, which will take place the latter part of July.

Book Review

Book of A.S.T.M. Standards, Part III, Nonmetallic Materials—General, 2202 pages, published by the American Society for Testing Materials, 260 South Broad street, Philadelphia 2. Price $10.

This volume for Part III of the 1944 Book of Standards of the American Society for Testing Materials contains 443 standard and tentative specifications and tests relating to a wide variety of materials in many fields. General types of materials include coal and coke; petroleum; electrical insulating materials; plastics; rubber products; textile materials; paper and paper products; soaps and other detergents; naval stores; water, and thermometers and general tests.

As in the case of the other volumes or parts, this contains all emergency and emergency alternate provisions which have been used to expedite production and procurement of important materials. The book also is arranged in two-column style to aid in easier reading. In addition to an excellent cross index at the back of the book, the contents are listed under material headings and according to serial designation.

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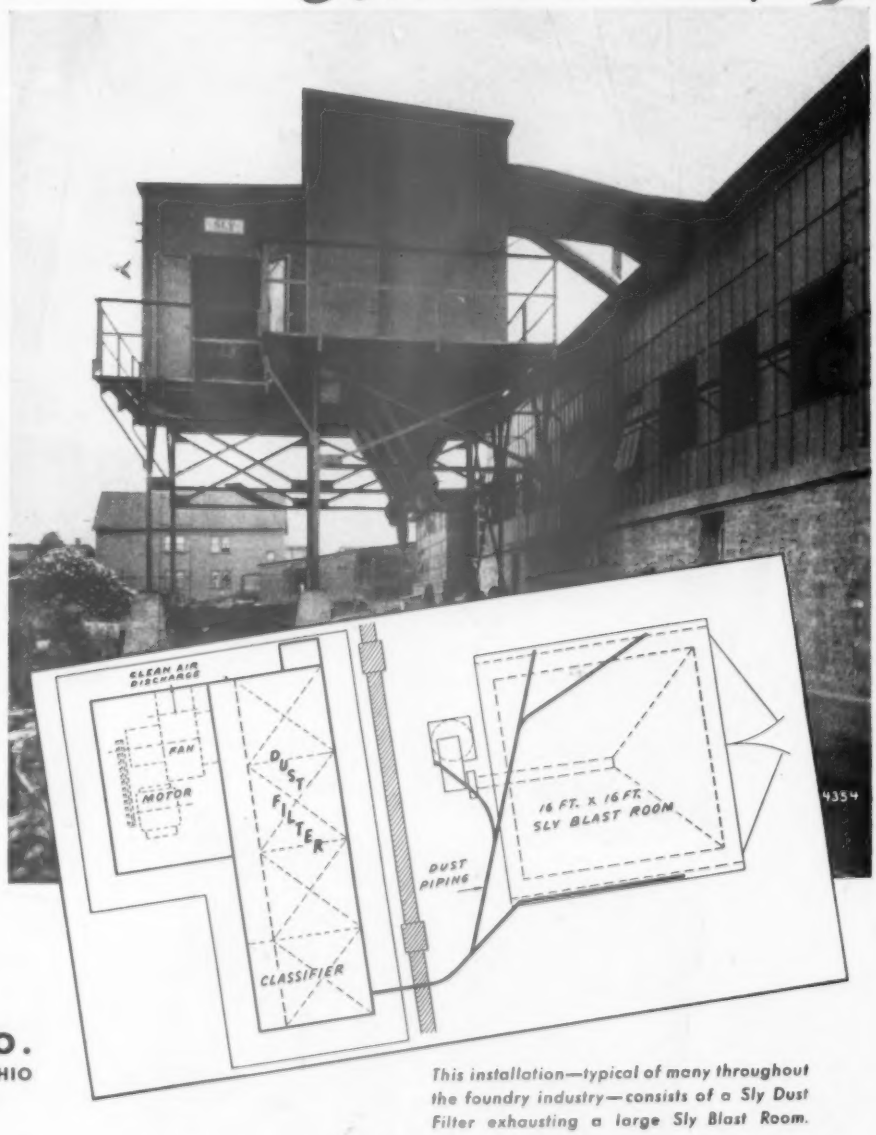


This installation—typical of many throughout the foundry industry—consists of a Sly Dust Filter exhausting a large Sly Blast Room.

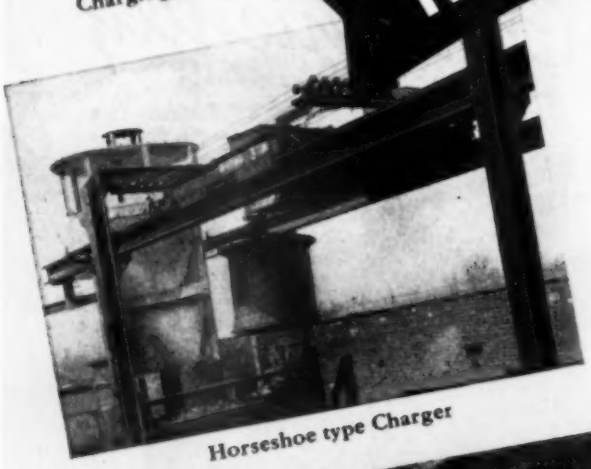
SLY INDUSTRIAL DUST CONTROL

TUMBLING MILLS BLAST CLEANING EQUIPMENT

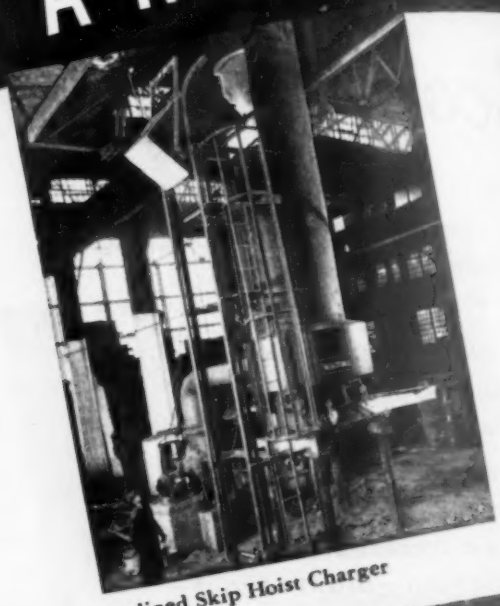
MANUFACTURER'S ASSOCIATION, INC.
FOUNDRY EQUIPMENT

MECHANICAL

Gantry type
Charging Crane

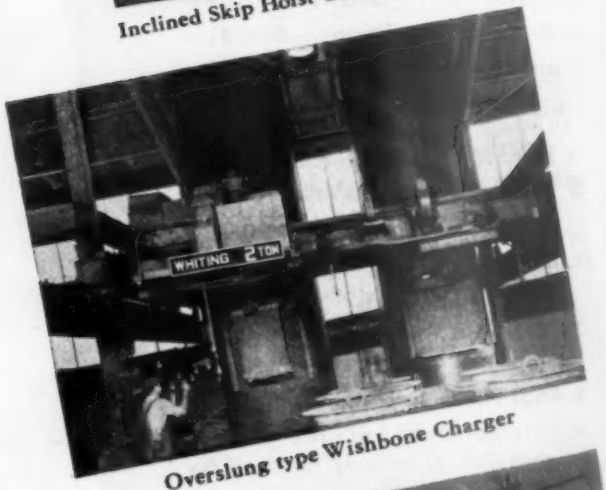


Horseshoe type Charger

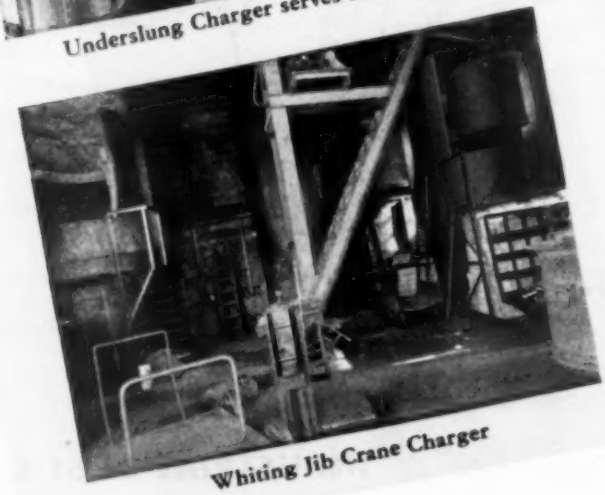


Inclined Skip Hoist Charger

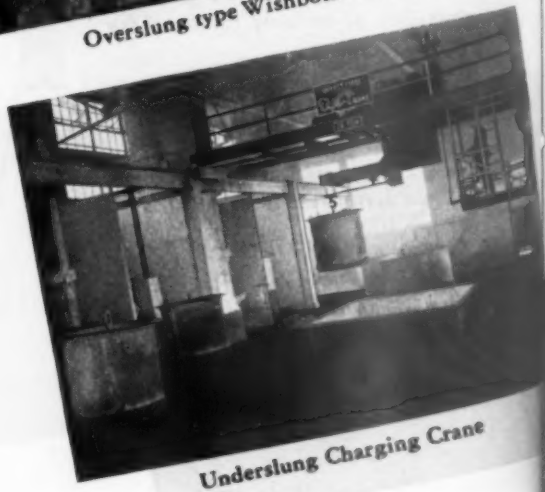
Underslung Charger serves two Cupolas



Overslung type Wishbone Charger



Whiting Jib Crane Charger



Underslung Charging Crane

Monorail type
Cupola Charger

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Carnegie-Illinois Steel Co.
Chicago, Milwaukee, St. Paul & Pacific R. R.
Canadian National Railways
Crane Co.
Continental Roll & Steel Foundry
James B. Clow & Sons
Chambersburg Engineering Co.
Dodge Manufacturing Co.
Dayton Malleable Iron Co.
Deere & Co.
Fairbanks Morse & Co.
Ford Motor Co.
Food Machinery Corp.
General Machinery Corp.
Gunite Foundries Corp.
General Steel Casting Co.
Howe Scale Co.
International Harvester Co.
Kaiser Co., Inc.
Laclede Steel Co.
Letourneau & Co.
Lake City Malleable Co.
McQuay Norris Manufacturing Co.
Minneapolis-Moline Power Implement Co.
Master Electric Co.
National Malleable & Steel Castings Co.
Nordberg Manufacturing Co.
Oliver Farm Equipment Co.
Packard Motor Car Co.
Pontiac Motor Co.
Republic Steel Corp.
Reading Pratt & Cady Co.
Ross-Meehan Foundries
Stanley Works
Shenango-Penn Mold Co.
Sears Roebuck & Co.
Sheffield Steel Corp.
Symington-Gould Corp.
Sargent & Co.
U. S. Pipe & Foundry Co.
Western Electric Co.
Worthington Pump & Machine Co.
Westinghouse Electric & Manufacturing Co.

Around DETROIT

BY A. H. ALLEN
Detroit Editor, The Foundry

Automotive reconversion race starts, with foundries facing relatively few problems in switch-over . . . Gray iron has best post-VE outlook among various types of castings

THEY'RE OFF!—the automotive plants on the great reconversion race; and if the running is true to form, there will be some pilot jobs off the lines before Sept. 1. This in spite of pessimistic official predictions now being made to the effect production will be lucky to get under way at all this year. Tremendous pressure is now being placed on all reconversion activities and while there is plenty of public wailing about the impeding effect of government controls on materials, inability to get decisions on disposal of government-owned machinery, and the lack of knowledge about war contract terminations, the production teams of the automotive plants are moving ahead quietly, slashing through the red tape jungles to get the job done and worry about the regulations later.

When the industry converted to war production, it had the full assistance of government and military agencies in expediting procurement of materials and equipment, plus a co-operative spirit between the various plants, which obviously greatly accelerated the building up of production of tanks, guns, engines, etc. Now that the process is in reverse, the wartime controls of the government, slow to be withdrawn, are proving to be a shackling influence, but as contracts are steadily cut back and ominous mutterings spread among displaced labor, the motor plants are inclined to act quickly and explain later, if such explanations be needed.

So, while official pronouncements from Washington announce July 1 as the date for abandonment of this and that regulatory measure, and the "open-ending" of CMP, etc., they really do not mean much. What it boils down to is this: You cannot ration a surplus. If the demand is there along with the capacity to fulfill it, without interfering with current war production, then there is little point to waiting for the official slip of paper which will authorize demand and supply getting together.

Where does all this leave automotive foundries? Well, it simply means extra pressure on these departments, since they have a longer "lead" time than many other units in the production picture. The "floats" must be built up between foundry and machine shop and between machine shop and subassembly, and between subassembly and final assembly. So, the large production gray iron shops of the motor industry shortly will be swinging into something like their normal pattern of castings output in 1941, or rather at 50 per cent of this pattern, since present schedules are being based on about 50 per cent of the 1941 assembly level, or an annual rate of something over 2,000,000 passenger cars a year.

Of all the captive gray iron foundries, those of Ford at the Rouge plant, and Chevrolet at Saginaw are in the best shape for a quick step-up in output of castings required in 1945 models. Chevrolet, in fact, has been in good production right along, supplying truck engine requirements, and recently has been supplying castings for "short blocks" built for replacement requirements. Buick and Packard gray iron foundries resumed output on a limited scale several months ago, at first furnishing Hercules truck engine castings, and then their own replacement castings. New production should follow along without too much difficulty.

Pontiac's gray iron shop is in excellent shape for a quick increase in passenger car castings for Pontiac and Olds 8-cylinder requirements. It has been in operation continuously, furnishing castings for GM truck engines and some diesel engines. Furthermore, in the past six months, every single type of gray iron casting going into a Pontiac car has been in production at one time or another, to build up stocks of replacement parts in dealers' hands. Thus, about all that is needed is the go-ahead signal, and a few hundred more men.

Only Signal Needed

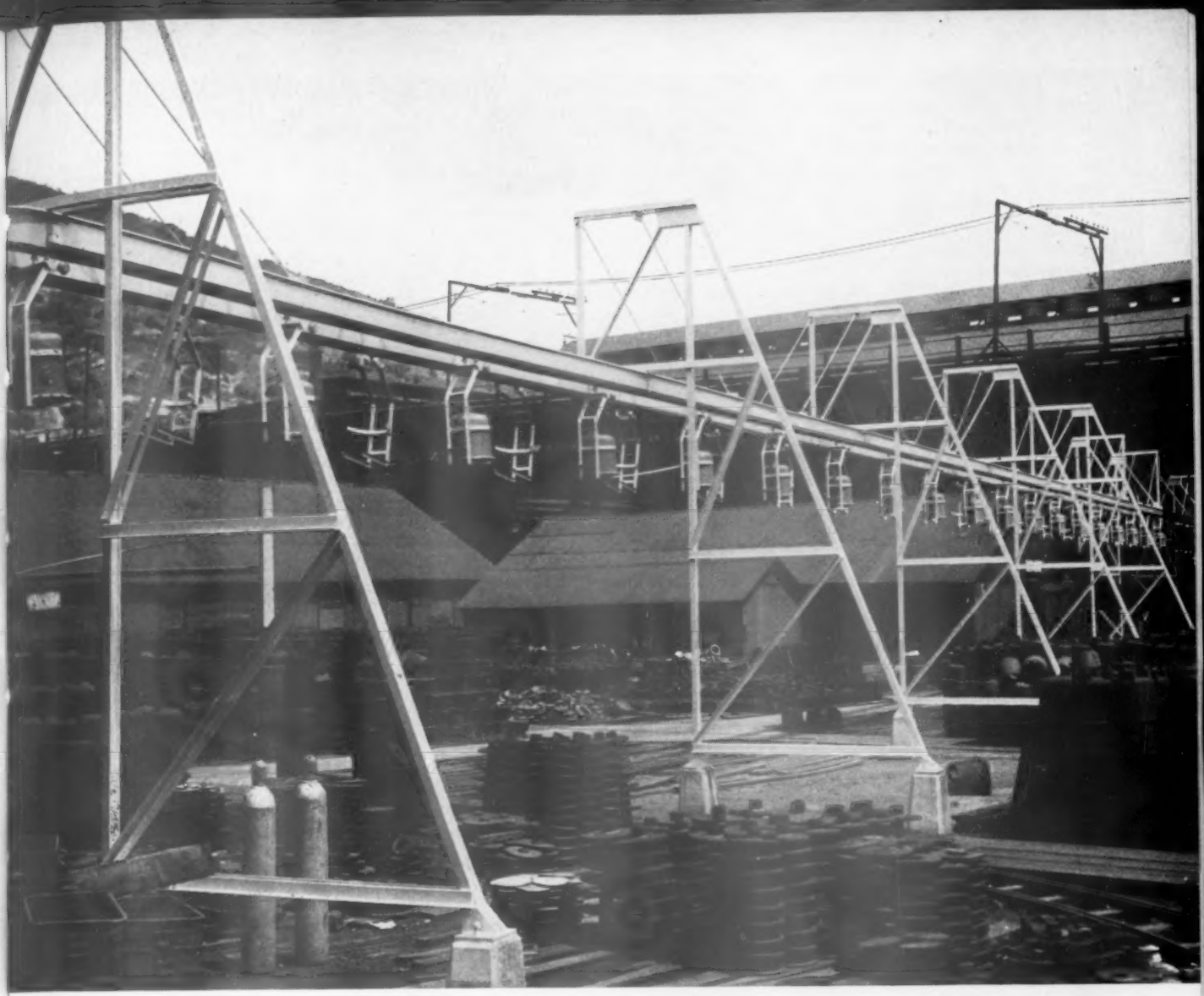
The Dodge foundry is in somewhat similar shape, never having been out of production. Likewise the large Studebaker foundry in South Bend which has been supplying thousands of castings for the Studebaker Champion engine used in the Army's M-29 Weasel personnel carrier. Wilson Foundry & Machine Co. in Pontiac, source for Willys-Overland castings, has just completed a modernization program involving expenditure of about $1,500,000, and should be ideally fixed to handle any automotive requirements of the Toledo producer. The Nash foundry in Kenosha probably will require a little more make-ready than some of those just mentioned. Hudson buys its castings on the outside, and hence will have to line up its old source. Chrysler also buys a considerable volume of its gray iron castings outside—principally from Lakey in Muskegon.

Actually, the foundry reconversion problem is nonexistent generally. All that is needed is the signal from the front office that such-and-such volume of certain types of castings are needed by a specified time. The rest is easy—at least compared with some of the headaches involved in cleaning out and rearranging machining departments and assembly floors.

What is the outlook for various types of castings made in this area, for the near future? First, it seems a good bet that there will be a sharp, perhaps precipitate, decline in demand for steel castings, as tank and armament schedules are

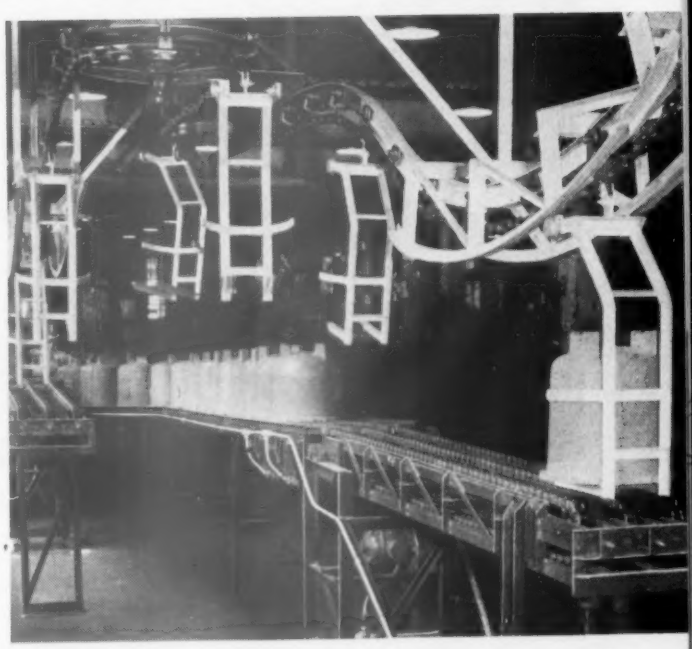
(*Concluded on page* 136)

VISIBILITY AIDS SAFETY—Camouflage in war has been raised to a science, but in factories visibility is the much-desired goal. The illustration shows a simple but effective method safety engineers use for increasing visibility of mobile equipment, contrasting color combinations of stripes or bars. Although a standard color for Elwell-Parker fork trucks is a bright yellow, engineers in this plant have applied the stripes and bars as an additional safety measure.



Put Mathews Methods Into Your Post-War Plans

The need for special devices in conveying systems, increased during these war years of fast and tremendous production, has found Mathews Engineering ready and eager for the job. Frequently, the conveying problems have been entirely new. Always, they have been different in some respects from even the most similar jobs in the past. The conveyers were needed quickly and the need was great. To meet this need, Mathews Engineers and production personnel have hammered away steadily, meeting these problems as they came, and solving them. As a result of this activity — these new problems— these special devices which were developed — many years of experience have been packed into a short while. That is why Mathews methods are up to the minute. This experience is available, through the Mathews Field Engineer, in all principal cities in the United States and Canada.



Mathews Conveyer Company

ELLWOOD CITY, PENNSYLVANIA

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

(*Concluded from page* 134)

scaled down. Some of the plants which back in 1942 were converting from gray iron to steel might well convert back to gray iron, if they have not already taken steps to do so.

Second, the near-term years look especially bright for producers of automotive gray iron in view of the motor industry's announced intention to build up to a volume something like 50 per cent ahead of the best yet realized. Part of this increase will be absorbed by expansions already mapped out for the captive automotive foundries, but it looks like ample business still left over for outside suppliers. On top of automotive demand, a sizable increase is looked for in castings requirements of the refrigeration industry, for example, along with air conditioning and a score of others whose castings business can logically be expected to center in this area.

Third, as far as malleable castings are concerned, sustained demand can be expected, since as war demand tapers increasing use of malleable in civilian products will take up the slack. Superior properties of malleable may find it replacing a number of gray iron uses, if the price differential is not too serious, but it is difficult to foresee for malleable the large increase in demand which seems in store for gray iron.

Fourth, on the score of aluminum and magnesium castings, an appreciable slump seems a foregone conclusion, as aircraft requirements evaporate and little else has yet appeared to replace them. Much interest attaches to the question of what will eventually happen to the large and elaborate aluminum foundry built by Buick for production of aircraft engine cylinder heads and later other aircraft engine castings.

The auto industry has placed before the WPB requests for approval of $35,000,000 worth of construction work, and $40,000,000 in tooling and equipment, plus the construction the latter involve. Most of this budget has been approved and has been assigned AA-3 priority. However, it is of an immediate character and only a small portion of the overall postwar program of expenditures for plant and equipment which car producers will make. For example, General Motors has announced it will spend something like $500,000,000 on expansions and improvements, and Ford $200,000,000. In these programs are a number of foundry expansions which have already been detailed to equipment suppliers but which have been put in the bottom drawer for months. They are still there, but probably will be pulled out and dusted off any day now as the reconversion picture clears.

For the present, though, facilities as they now stand will serve to handle initial production requirements. The new programs will apply for the 1946 and 1947 models, and augur well for a continuing good level of foundry equipment business. Large-scale programs are involved for Chevrolet Gray Iron, Pontiac, and Cadillac foundries, to name only three.

There will likely be many makeshifts necessary in the first passenger cars run off the lines this summer, as a result of critical spot shortages in some key items. Industry executives are confident they can find ways around these shortages, and they probably will eventually, but at the start it will be a matter of getting the cars off the line and into dealers' showrooms. If a bumper, or a radiator grille, or a speedometer is missing, they can be replaced when the supply is available; the main thing is to get production rolling, to minimize unemployment, to grease the supplier-manufacturer-dealer-buyer chain.

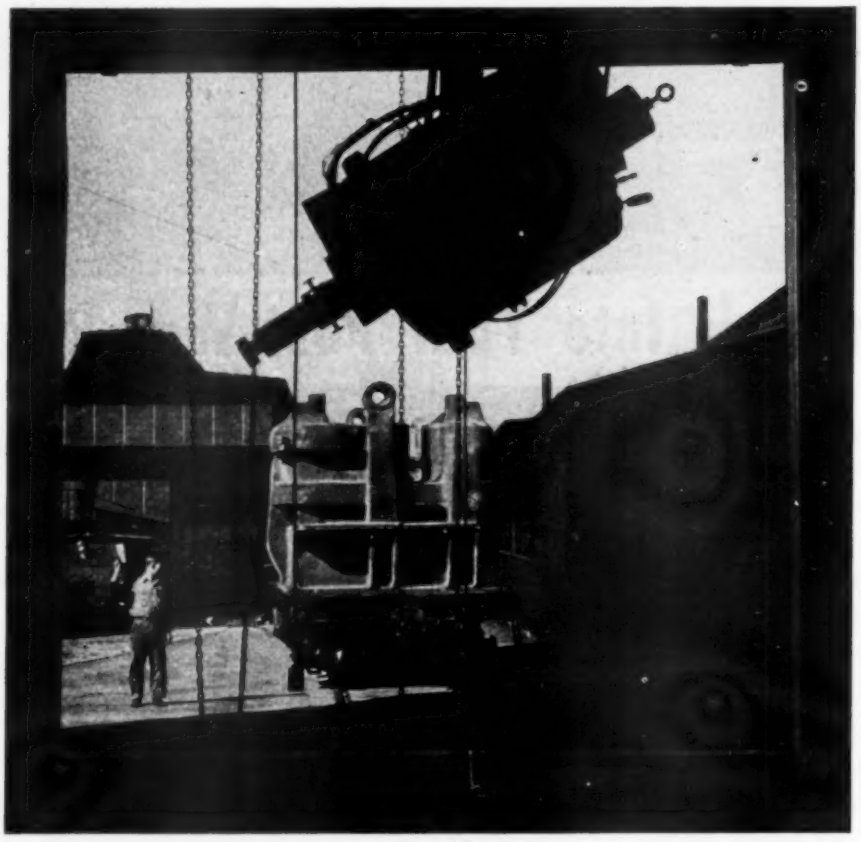
Scene Is Bright

Right now, the principal shortages being talked are textile, batteries, tin, paint. The situation could change overnight, so there is not too much concern being shown over them. Ford, for example, has stated a sufficient supply of textiles is on hand, left over from the 1942 model production, to get started on the 1945 jobs. Also, some new textile substitutes have appeared.

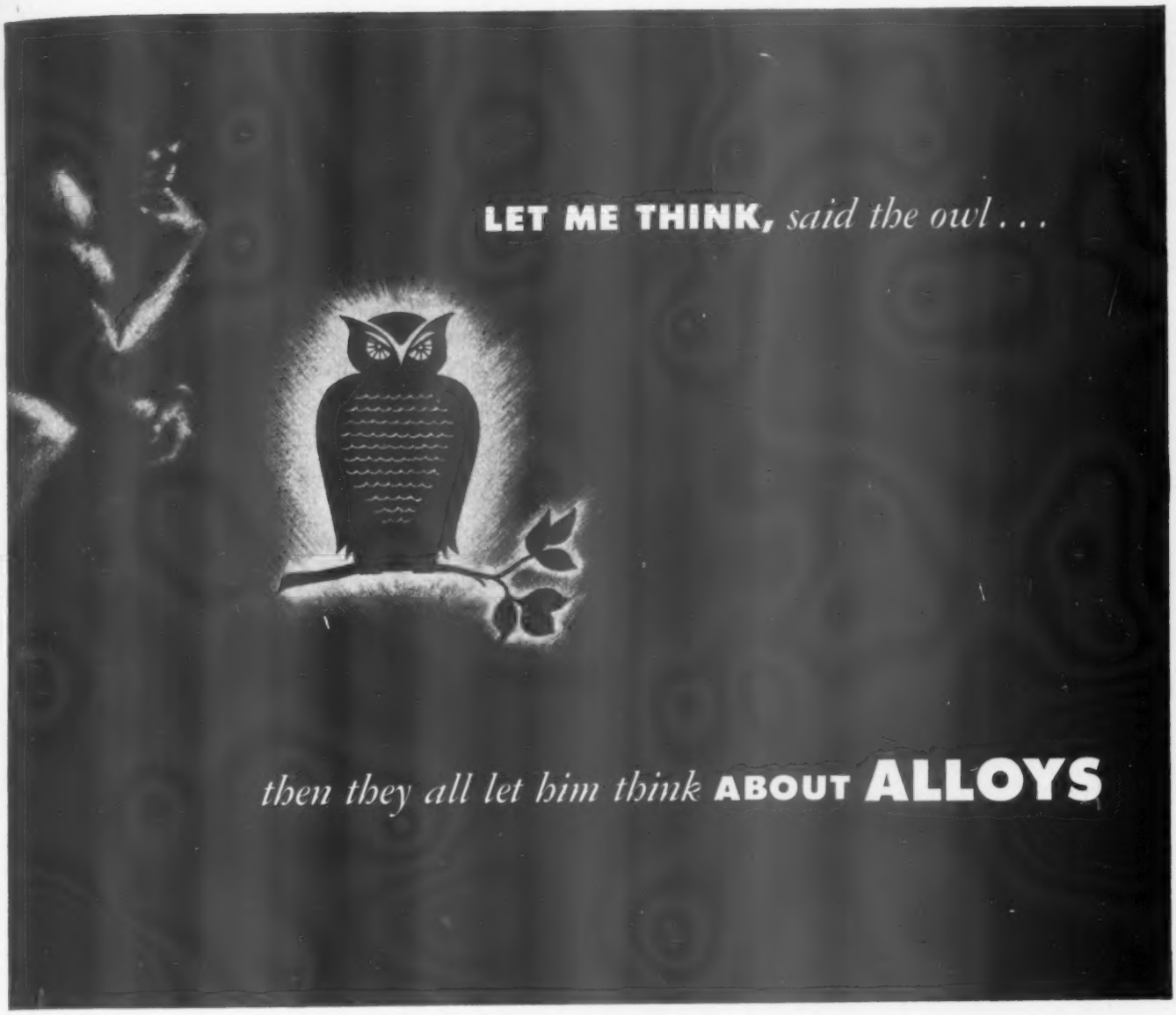
All in all, as of May 15, the automotive picture behind the scenes is bright. On the surface, the troubles are being emphasized and rightly so, for that is the quickest way to get action in Washington. Labor remains a question mark. Will it be possible to restore productivity to prewar levels, to win acceptance for sound and equitable incentive systems? Costs remain a question mark. How much will they increase and how far will it be necessary to increase prices? These questions will have to be answered, but for the moment they are subordinate to getting production rolling.

Local gossip columnist has broken the story of a group of Chicago millionnaires getting together a kitty of $120,000,000 for production of 250,000 copies of a radically new type of automobile, with 4-cylinder X-type air-cooled engine in the rear, integrated with the transmission and weighing only 390 pounds, and the car itself weighing under 2000 pounds. Steel chassis and body, aluminum top, fluid clutch, automatic gearshift, price $850, sold through gas stations. Could be.

The Meehanite Metal Corp., New Rochelle, N. Y., has concluded a contract in Australia with Kelvinator Australia Ltd., Adelaide, South Australia, a subsidiary of Nash-Kelvinator Corp., Detroit.



PRODUCTION WEAPON: ***Entrance to the exposure room of Continental Foundry & Machine Co.'s X-ray laboratory at its Chicago Works provides a frame for this unusual picture of the million-volt machine head and one of the larger steel castings it is used to inspect. The unique door to this four-story-high room weighs 68 tons and requires nearly 5 minutes to be raised hydraulically to full height. Large castings are X-rayed without being moved from the flat car which hauls them to the exposure room. Said to be the most complete and best equipped laboratory of its kind in the world, it is used not only for inspection of both large and small castings but also in studies to attain the best possible casting design***



Experience in wartime will have its values for the period to follow and all the newly developed possibilities of alloyed metals are not likely to be forgotten. When our swords are beaten into plowshares and our spears into pruning hooks, the same elements that gave matchless quality to war weapons will do likewise for the implements of peace.

It is only because they were indispensable for war that certain alloys have been withheld from civilian use and alternative materials have for the moment been made to serve. Each will find its own place before long and whatever may be said of other things it is clear that alloys will claim not only larger but more discriminating employment.

The uses of Molybdenum, Tungsten, and Boron in their various forms and combinations are described in the literature of the Molybdenum Corporation. Correspondence is invited.

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MCA

foundry DEVELOPMENTS

FIRST report of the foundry practice subcommittee of the steel castings research committee of the Iron and Steel Institute (Great Britain) describes some of the work it has conducted on running and risering simple shape castings such as 4, 6 and 9-inch cube castings, and 6-inch square castings 12, 18 and 24 inches long. Narrow heads were found to freeze prematurely while wider heads, insulated heads and mold materials which promote differential solidification function effectively. The so-called whirlgate head method of feeding steel castings was found to give excellent results. In this method the sprue is connected to the riser or header by a runner so that the metal enters tangentially, and the header is placed close to and at the side of the casting with a constricted opening between the two. The short neck and constricted opening causes a hot spot, and good feeding of the casting.

• • •

OPEN salamanders frequently are used as heating units in the chilly winter atmosphere in the foundry. In the general field of hygienics the rating is rather low. Fumes from the burning coke produce no ill effects on many employes. However, a certain number of the employes may experience distress from breathing the fume laden air, and this is particularly true of the crane operators who travel in an area where the fumes are in greater volume than they are in the lower levels. A solution for the problem has been found by attaching a stove pipe to the salamander. The upper end of the pipe extends through a hole in the wall or in the roof, depending on whether the salamander is close to a wall, or to one of the columns supporting the crane runway.

• • •

PROMINENT manufacturer of cast steel rolls claims that use of circulating water chillers produces a finer crystalline structure, and a deeper penetration of that structure than when plain iron chills are employed. Result is believed to be due to the continuous and more rapid dissipation of heat from the casting during cooling. Temperature readings taken at casting surface of a 25½ x 80-inch roll weighing 16 tons as cast, with the solid chill show that the heat is dissipated rapidly for a couple of hours, and the temperature sharply increases until at the end of 7½ hours a peak of 1675 degrees Fahr. is reached. Temperature then decreases slowly showing 1550 degrees at 12 hours, 1490 degrees at 16 hours, 1400 degrees at 20 hours, and 1350 degrees at 24 hours. In case of the water chill with readings taken at the face of a larger roll 42⅝ x 100 inches weighing 56½ tons as cast, the temperature rises steeply with a peak of 2475 degrees in about ½-hour, and then begins to decrease uniformly and rapidly reaching 1675 degrees in 8-1/3 hours, 1550 degrees in 10 hours, 1490 degrees in 11 hours, 1400 degrees in 13 hours, 1350 degrees in 14 hours, and 1250 degrees in 16½ hours.

• • •

IN AN investigation of centrifugal casting in a machine rotating on a horizontal axis and using a metal mold, Northcott and Dickin found that inverse segregation, as encountered in certain bronze alloys and aluminum-copper alloys, was decreased considerably. Also that with fast pouring and hot metal the phenomenon was considerably less than with cold metal and slow pouring. Reason is believed to be that fast pouring and hot metal favor centrifuging action by increasing time for solidification and the quantity of metal for separation—resulting in a more uniform final composition.

• • •

INTERESTING articles have been published at various times describing and extolling the merits of a high pouring head as a factor in securing solid castings. In a recent series of experiments a prominent Eastern foundryman has produced steel valves and other castings by this method. The castings have been machined and have passed x-ray and pressure tests satisfactorily. Metal is poured through a single sprue which extends about 2 feet above the cope. Total absence of risers give a casting yield of approximately 80 per cent instead of the usual 50 per cent, and a resulting and even greater improvement in the chipping and cleaning cost.

• • •

WHILE developed some years ago, it is claimed that study and improvements in stainless steel shot and its applications has resulted in a better procedure for cleaning stainless steel castings. It is said that ordinary shot tends to leave a film of iron on the stainless material which will rust when exposed to atmospheric conditions, unless carefully removed. With stainless steel shot trouble from that source is eliminated, and cleaning is accomplished in the conventional manner using standard equipment.

• • •

TWO recently developed materials in the form of a paste and a liquid are available for protection of wood and other materials against fire hazard. The paste after dilution can be applied with a brush or spray gun to the surface to be protected and covers about 185 square feet per gallon with two coats. Standard color is bone white, but tints may be added easily. Liquid protective agent is applied by dipping the wood or material in the solution, and it is claimed that the dimensions of the wood are not changed. Color of the solution is dark blue which dries to a pale aquamarine.

• • •

RECENTLY completed standard specifications of the American Standards Association, 70 East Forty-fifth street, New York 17, cover asbestos aprons, cape sleeves and bibs, leggings, and coats for use in foundries, steel mills and other industries for protection against heat and spills or splashes of molten metal. Quality of the asbestos and design of the garment are chief considerations since it is of vital importance whether splashed asbestos coats, leggings or sleeves will scorch slowly enough to give the wearers time to get out of danger and remove the garment, and the speed with which the smoldering garments can be shed.—E. B.

INVESTIGATION of centrifugal casting of aluminum alloys by Northcott and Lee as described in the March, 1945 issue of the JOURNAL of the Institute of Metals (Great Britain) led to certain generalization. Casting used in the work was a flanged wheel 10 inches in diameter with a flange 2 x ½-inch, rim 1 x ⅝-inch, and 5 spokes which were varied in cross section from 1¼ x ¼-inch to 1¼ x ⅝-inch. It was found that speed of rotation must be high. With the particular sand and conditions employed in the investigation, maximum safe speed was about 2600 surface feet per minute or 32 pounds per square inch maximum internal pressure. Soundness and strength improved as speed was increased, and further improvement in surface quality would be expected if a speed of 3000 feet per minute (47 pounds per square inch maximum internal pressure) could be obtained with safety. With unsatisfactory conditions, internal porosity is concentrated at rim ends of the arms. Centrifugal process permits use of very low casting temperatures. As little as 41 degrees Fahr. superheat being adequate, and total shrinkage then is reduced to a minimum. To insure adequate feeding ratio of arm cross-section to rim volume must be at least 1:10 as it is more difficult to feed along thin sections from a central runner. Practical method of minimizing radial segregation and columnar crystal growth is to pour at a low degree of superheat into unwarmed molds.

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REVISE SPECIFICATIONS

For Steel Castings

REVISIONS in specifications for steel castings now are in the process of being formulated as the result of efforts of several technical and government groups.

ASTM Specification A-148 relating to "High Strength Steel Castings for Structural Purposes" will be revised, subject to letter ballot, to reduce the number of grades covered from eight to seven. Designations will be changed from "Class A", etc. to Grade 80-40 and the like since the figures, which relate to tensile strength and yield point, are more descriptive.

As will be noted by referring to the seven grades included in Table I, maximums are specified only on sulphur and phosphorus, the amount of other elements being left up to the maker of the castings. It also will be observed that the seven grades provide for a range in tensile strength from 80,000 to 175,000 pounds per square inch compared with 75,000 to 150,000 for the eight grades previously listed.

Subject to approval by ballot, ASTM Specifications A-27, A-87 and A-215 will be combined under a new number and the title, "Mild to Medium Strength Carbon-Steel Castings for General Application". The three specifications previously covered were, respectively, "Carbon-Steel Castings for Miscellaneous Industrial Uses", "Carbon-Steel and Alloy-Steel Castings for Railroads" and "Carbon-Steel Castings Suitable for Fusion Welding for Miscellaneous Industrial Uses".

The chemical requirements and tensile properties of the eight grades included in the combined specifications are shown in Table II. More complete chemical specifications are set up than under A-148 since the weldable grades are included.

A chromium-molybdenum grade has been included under ASTM Specification A-217, "Alloy Steel Castings Suitable for Fusion Welding for Service at Temperatures from 750 to 1100 degrees Fahr." The new grade, designated as WC-3, seems to retard graphitization in high temperature service, such as in steam lines. It has the following analysis: 0.30 per cent carbon max., 0.70 per cent manganese max., 0.60 per cent silicon max., 0.06 per cent sulphur max., 0.05 per cent phosphorus max., 0.40-0.70 per cent chromium and 0.40-0.60 per cent molybdenum. Tensile strength is 70,000 pounds per square inch, yield point 45,000 pounds per square inch, elongation 22 per cent and reduction of area 35 per cent. The molybdenum range in WC-4 will be increased from 0.35-0.45 to 0.40-0.60 per cent.

SAE now is in the process of preparing specifications for steel castings based upon the use of hardenability bands. Work is being done by a subcommittee of the SAE Iron and Steel Division in co-operation with ASTM. Steel casting producers and consumers in the automotive, aviation and tractor industries are participating in the work.

These industries wish to purchase steel castings in an annealed or normalized condition which will provide predetermined physical properties upon being heat treated. Chemical compositions are left to steel casting producers, since hardenability bands provide the governing factor over physical properties.

Tentative specifications have been written by the SAE War Engineering Board in co-operation with the Office of the Chief of Ordnance at Detroit for the repair welding of steel and malleable iron castings. These specifications are of the shop procedure or shop notes type.

The Navy department also is preparing a new specification, 46S-33, for chromium-molybdenum steel castings similar to ASTM grade WC-3.

Book Review

Handbook on Designing for Quantity Production, by Herbert Chase, cloth, 517 pages, 5¼ x 8½ inches, published by McGraw-Hill Book Co. Inc., New York. Price $5.

Designers and stylists of products to be produced economically in quantity should know how to design the product as a whole and its parts so that they lend themselves to ready manufacture by high production processes such as casting, stamping, forging, etc. The section on "Design of Sand Casting for Production in Quantity" was prepared by Norman F. Hindle of the American Foundrymen's Association.

Contents of the book are divided into two parts of which the first gives the essential points of designing for specific methods of fabrication while the second gives comparative costs of the same product made by different methods. Phases covered in the first part relate to design for die castings, sand castings, screw-machine products, stampings, forged parts, hot heading, cold heading, and plastic molding. Second part compares die casting and sand casting; permanent mold and die casting; type of nonferrous casting; die casting and stamping; die casting and screw-machine; cold heading and screw-machine, and die casting and plastic molding.

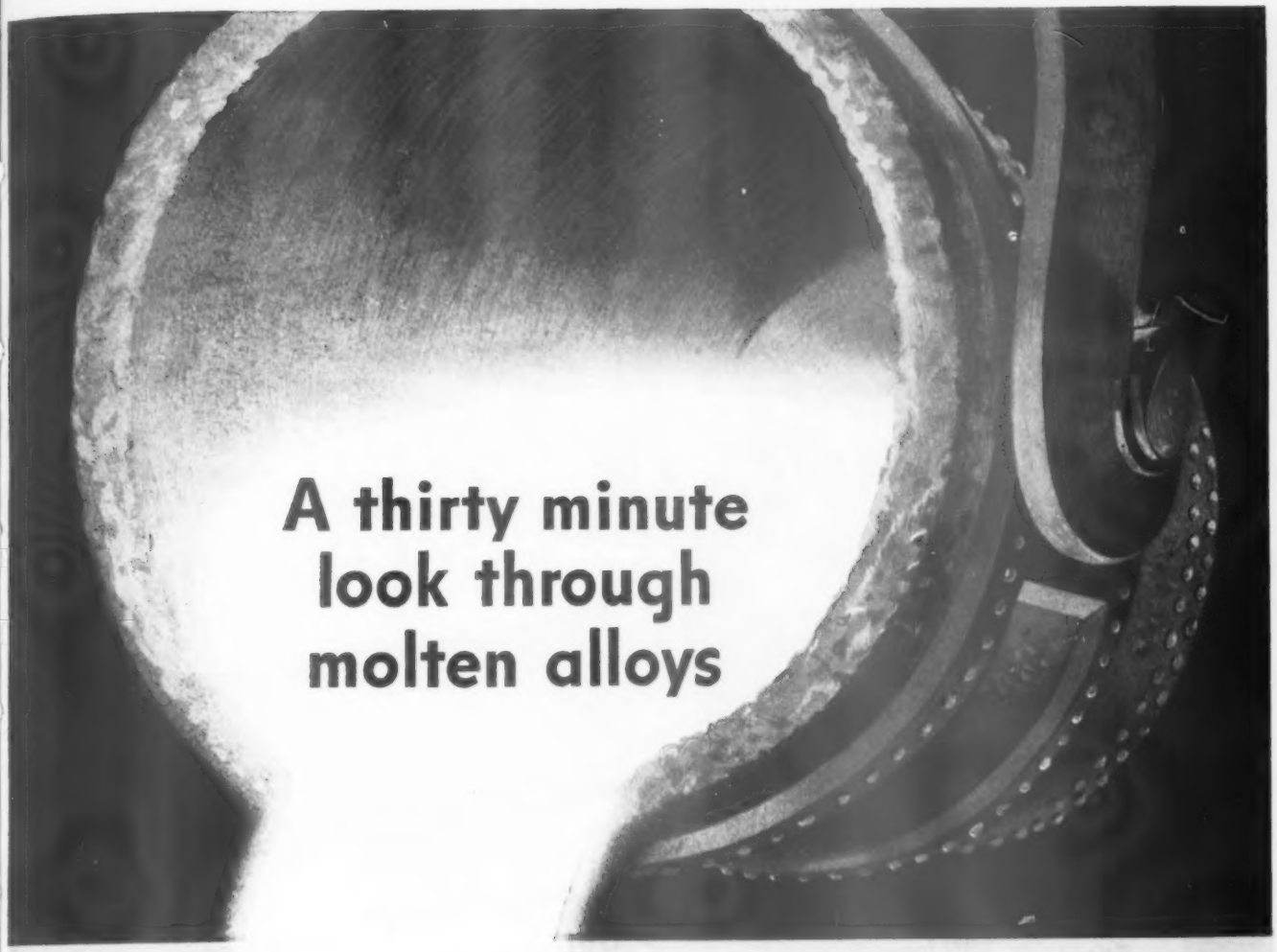
TABLE 1—Specifications for High Strength Steel Castings for Structural Purposes

	—Chemical Requirements—			—Physical Requirements—		
Grade	Sulphur Maximum Per Cent	Phosphorus Maximum Per Cent	Tensile Str. Minimum psi	Yield Point Minimum psi	Elongation In 2 in. Minimum Per Cent	Reduction of Area Minimum Per Cent
80- 40	0.06	0.05	80,000			
80- 50	0.06	0.05	80,000	40,000	18	30
90- 60	0.06	0.05	90,000	50,000	22	35
105- 85	0.06	0.05	105,000	60,000	22	40
120-100	0.06	0.05	120,000	85,000	17	35
150-125	0.06	0.05	150,000	100,000	14	35
175-145	0.06	0.05	175,000	125,000	10	25
				145,000	6	12

TABLE II—Specifications for Mild to Medium Strength Carbon-Steel Castings for General Application

Grade	C* Max. %	Mn* Max. %	Si Max. %	S Max. %	P Max. %	Tensile Strength Min. psi	Yield Point Min. psi	Elongation In 2 in. Min. Per Cent	Reduction of Area Min. Per Cent
N-1	0.25	0.75	0.60	0.06		.....	.....	..	..
N-2	0.35	0.60	0.60	0.06	0.05	.....	.....	..	..
N-3	...	1.00	...	0.06	0.05	.....	.....	..	..
U-60-30	0.25	0.75	0.60	0.06	0.05	.....	.....	..	..
60-30	0.30	0.60	0.60	0.06	0.05	60,000	30,000	22	30
65-30	...	...	...	0.06	0.05	60,000	30,000	24	35
65-35	0.30	0.70	0.60	0.06	0.05	65,000	30,000	20	30
70-36	0.35	0.70	0.60	0.06	0.05	65,000	35,000	24	35
					0.05	70,000	36,000	22	30

* For each reduction of 0.01% carbon below the maximum specified, an increase of 0.04% manganese above the maximum specified will be permitted to a maximum of 1.00%.



A thirty minute look through molten alloys

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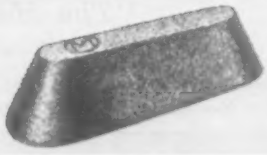

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Certified Rapidry Core Oil, like all the core oil we have ever sold, is supplied with the distinct understanding that the quality must be as represented, be of strictly uniform quality and give complete satisfaction—or be returned for full credit.

We are able to apply this guarantee to Rapidry Core Oil, which costs considerably less than conventional core oils, because we know the results it is producing in a host of foundries.

There's a grade of Certified Rapidry Core Oil for every foundry condition and type of sand. To obtain a trial order, just specify the grade and number of the core oil you use; whether it is golden or dark in color, the type and mesh of your sand and a general description of your oven conditions.

CERTIFIED CORE OIL & MFG. CO.

"The House of Dependability"

3308-26 South Cicero Avenue, Cicero, Illinois

Stock and Representatives: Buffalo, N.Y. Elmira, N.Y. Worcester, Mass. Reading, Pa. Newark, N. J. St. Louis, Mo. Milwaukee, Wisc. New Orleans, La. Houston, Tex. Chattanooga, Tenn. Minneapolis, Minn. Portland, Ore.

Industry BRIEFS

CANCELLATION of plans for an increase in army tank production has resulted in abandonment of various proposed foundry projects, some of which had been partly under way. Plants affected include American Steel Foundries, East Chicago, Ind., and Ordnance Steel Foundry plant and Quad Cities Tank Arsenal (International Harvester Co.), both of Bettendorf, Iowa.

• • •

Buffalo Foundry & Machine Co., Buffalo, has been acquired by the Blaw-Knox Co., Pittsburgh, and will be known as the Buflovak Equipment Division of the latter company. The sale involves no changes in management or personnel of the Buffalo company.

• • •

Allis-Chalmers Mfg. Co., West Allis, Wis., has let contract to Meredith Bros. Inc., Milwaukee, for a one-story 60 x 502-foot pattern shop addition and steel foundry and pattern shop office alterations, to cost about $98,000. C. E. Meyer is architect.

• • •

Calumet Brass Foundry, Chicago, suffered fire damage estimated at $4400 April 21 when a small building used for melting brass burned from ignition of overflowing oil.

• • •

Pittsburgh Spring & Steel Co., Pittsburgh, manufacturers of spiral and elliptical springs, has been acquired by Pittsburgh Steel Foundry Corp., Glassport, Pa. G. D. Thompson is president of the new subsidiary company, and E. S. Weidle has been appointed vice president. The company will be operated under its present corporate name as a division of Pittsburgh Steel Foundry.

• • •

Saginaw Malleable Division of General Motors Corp., Saginaw, Mich., has let contract to Austin Co. Inc., Detroit, for design and construction of a brick, steel and reinforced concrete plant to cost about $238,000.

• • •

Neenah Foundry Co., Neenah, Wis., has let contract to Fluor Bros. Construction Co., Oshkosh, Wis., for a one-story addition.

• • •

Main factory of E. C. Stearns & Co., Syracuse, N. Y., was totally destroyed by fire April 6 and is expected to be out of production for a number of months.

• • •

General Steel Castings Corp., Eddystone, Pa., plans a plant addition costing about $40,000.

• • •

Columbia Machine Works Inc., Brooklyn, N. Y., has been acquired as a subsidiary by Maguire Industries Inc., New York. Thomas Meloy continues as vice president and general manager of Columbia, with Russell Maguire, president of the parent organization, as president.

• • •

Art, Bronze & Iron Works, Danville, Pa., has been purchased by the Safe Tread Co., Inc., New York and will be expanded in the manufacture of brass, aluminum and gray iron castings.

• • •

Ohio Foundry Co., 9812 Quincy avenue, Cleveland, will build a one-story foundry addition 30 x 60 feet, at 2469 East Seventy-first street, to cost about $8500.

• • •

National Foundry Supply Co., Milwaukee, has been incorporated with 100 shares no par value to deal in foundry supplies, by F. Clinton McCarthy, 231 West Wisconsin avenue, Milwaukee.

• • •

Whiting Corp., Harvey, Ill., has purchased the manufacturing and sales rights of the Douthitt, Grey-Jensen spray dryer used in processing of powdered foods.

• • •

Wadsworth Testing Laboratory, formerly of Wadsworth, O., has changed its location to 1600 Fourth street, Canton 4, O. Nils E. Moore is owner.

• • •

Wetzel Foundry Co., Riverside, Pa., a newly organized firm, will specialize in iron, brass and bronze moldings.

Wet Cleaning Small Castings

INCORPORATING use of wet method equipment for cleaning small hard iron castings, the Federal Malleable Co., West Allis, Wis., has devised a rapid system for cleaning and sorting on a continuous basis. The arrangement permits all of the work to be handled by the sorters and chippers and does not require the full-time services of one man to load and unload the tumbling mills, as in former practice.

The cleaning unit used is a 60 x 72-inch Ransohoff mill of the end-loading, end-unloading type. It is capable of handling every 12 minutes approximately 2500 pounds of castings weighing individually from a few ounces up to 15 pounds.

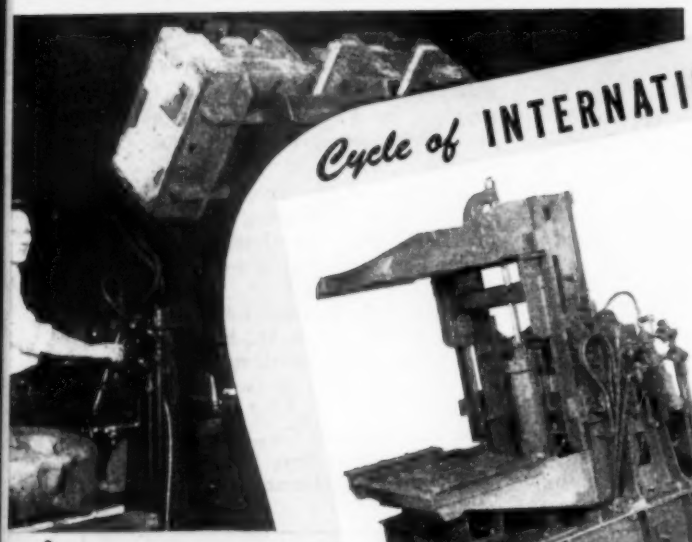
Castings removed from the shakeout are placed in tote boxes and carried by crane to the cleaning department where they are dumped directly into the mill hopper. When the barrel is rotated the castings cascade in a mass of stars; this removes the adhering sand, which is washed away by a hot solution pumped through the drum At the end of the cleaning cycle the drum's rotation is reversed, automatically causing the stars to be separated from the work and the castings to be discharged onto a wood table located at the exit end of the mill.

As shown in the illustration, this table is placed on a roller conveyor so that it may be pushed forward as the

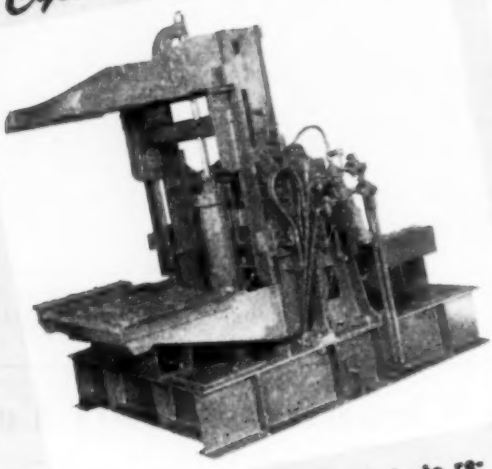
mill discharges, and distribute the castings evenly. Rails fastened to the edges of the table prevent castings from spilling to the floor as they drop from the mill.

Automatic separation of the stars permits the mill to be available immediately to tumble the next batch of work while operators sort the discharged pile and toss the castings into wheelbarrows to the rear. By the time the table has been cleared another load of cleaned castings is ready to be discharged and sorted.

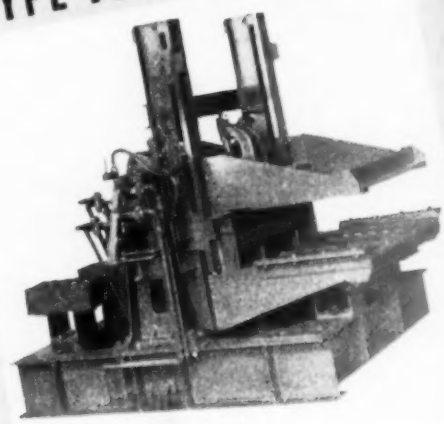
Since the solution pumped through the drum during the cleaning operation is hot, the castings dry quickly; also the addition of a small amount of inhibitor helps to prevent rust. Accumulated sand is washed out of the drum into a conveyor located next to the mill. The sand drains sufficiently for easy handling but is not dry enough to create a dust problem.



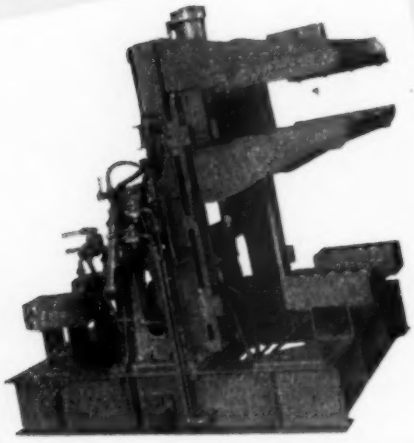
Cycle of INTERNATIONAL TYPE AN MACHINE



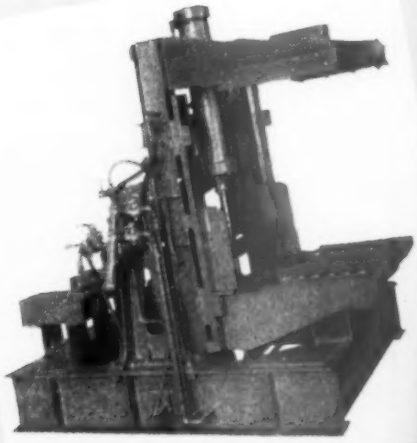
The machine is shown ready to receive the core box after it has been rammed.



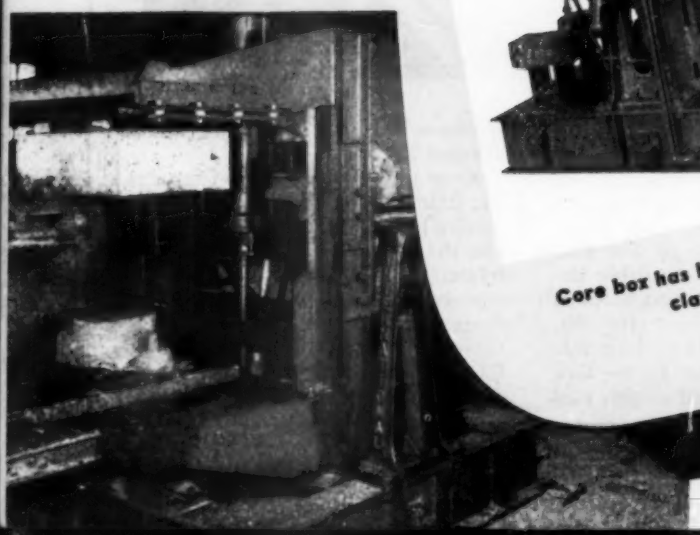
The draw frame has been moved into the position of clamping the core box and core plate.



Core box has been rolled over in the clamp position.



The core and core plate have been drawn from the core box.



Hard to Draw . . . Short Run . . . Many Different Sizes of Boxes

INTERNATIONAL Type AN Machine for clamping and turning over core boxes and for drawing the core. No rigging time required. The core box is fastened to the turnover frame by sliding the cleats that have been fastened to the under side of the box into the grooves with which the turnover frame has been provided. Absolutely no adjustments are required. When boxes are changed from one size to another, irrespective of how much difference there is in the width, length and depth of boxes for which machine has been recommended, it automatically takes care of variations.

Has Air Clamp, Air Turnover, Air Draw Features. Flexibility and universal use has made the **Type AN Machine** popular. Easily adaptable to your molding problems. **Specify Internationals** and be certain of satisfaction.

INTERNATIONAL MOLDING MACHINE COMPANY 2608 WEST SIXTEENTH STREET CHICAGO 8, ILLINOIS

Activities of foundry GROUPS

New England

REGULAR monthly meeting of the New England Foundrymen's Association was held at the Engineers' Club, Boston, April 11, with approximately 100 members and guests in attendance. In the absence of the scheduled speaker, Arthur J. Tuscany of the Foundry Equipment Manufacturers' Association Inc., R. F. Harrington, Hunt-Spiller Mfg. Corp., Boston, gave a short address, followed by a round-table discussion, which he led.

A detailed discussion of the advantages of the sandslinger occupied a large part of the evening and many of the members related their experiences with this equipment. Joseph Stazinski, General Electric Co., stated that in his experiences wood patterns stood up as well when used with a sandslinger as when used with jolt machines. A. E. Blake Jr. and E. H. Ballard, General Electric Co., spoke briefly concerning cost and depreciation of foundry equipment in general.

Thomas Weiser, Griffin Wheel Co., commented on the use of respirators, stating that with a good working shakeout, minimum use of respirators was required. James Gillis, Roxbury Steel Casting Co., spoke of the advantages of knock-off risers and explained the number, size, and feeding orifice necessary. The principle of the Washburn knock-off riser is a separation of the riser from the casting by a thin oil-sand core through the center of which a small feeder hole is placed. In many applications this riser has contributed to production of sound castings and at the same time has been readily removed at small cost. The yield on steel castings employing this type of riser is rarely better than 50 per cent, it was stated.

Michael Bock, Boston Navy Yard, supplemented Mr. Gillis' remarks by a detailed discussion of their use of this type of riser. James Stringfellow, Draper Corp., also brought out some interesting points in discussion. Mr. Harrington concluded the meeting by summing up various points brought out by the members.—*Merton A. Hosmer, president.*

CHAPTER MEETING—TEXAS STYLE: *The great outdoors provided the auditorium for the business and technical meeting of the Texas Chapter, A.F.A., on April 12 at Lufkin, Tex. Shown above, left to right, are: J. A. Gitzen, Delta Oil Products Co., Milwaukee, technical speaker; F. M. Wittlinger, Texas Electric Steel Casting Corp., Houston, chapter chairman; W. C. Trout, Lufkin Foundry & Machine Co. (Photos on this and following page courtesy E. P. Trout, Lufkin Foundry & Machine Co.)*

Texas

ON APRIL 12 some 150 members of the Texas Chapter of the A.F.A., with representation from all the foundry centers of that great state, were guests of the Lufkin Foundry & Machine Co. and the Texas Foundries Inc., two of the outstanding foundries of Texas located at Lufkin, at an all-day meeting.

The morning was spent in plant visitations at the two plants, where some outstanding practices were viewed. The group was the guest of W. C. Trout, president, Lufkin Foundry & Machine Co., at a southern fried chicken luncheon. In the afternoon a number of those present participated in a golf tournament, and at 6 p.m. the members assembled in front of the clubhouse of the Lufkin Country Club, with Chapter Chairman F. M. Wittlinger presiding. National Director I. R. Wagner, Electric Steel Casting Co., Indianapolis, spoke briefly as chairman of the A.F.A. Committee on Chapter Contacts. He was followed by a few remarks from Secretary R. E. Kennedy on the national organization. Mr. Wittlinger then introduced W. C. Trout, who gave a short address on, "Industrial Relations Affecting the Postwar Industry." The speaker of the evening, Joe E. Gitzen, president, Delta Oil Products Co., Milwaukee, was then introduced, and gave an interesting discussion of factors involved in the use of core binders. He stressed the necessity of complete baking of any oil sand cores. Mr. Gitzen's talk contained many practical and valuable suggestions.

Following the technical talk, the members were treated to an old-fashioned southern barbecue, and the northerners who were present can assure the other members of the A.F.A. that they missed a real treat, for the steaks were so tender that they could be cut with a spoon. Entertainment of the evening was provided by six local colored residents who had formed a string band, and their songs and dancing were thoroughly enjoyed. Harry Wren, chapter secretary, showed his ability by being able to strut his stuff in a way which did not suffer in comparison with the other local talent.

Chairman of the program committee was Jack Klein, Texas Foundries Inc., and vice chairman of the chapter. Ed Trout, Lufkin Foundry & Machine Co., was the diligent worker who took care of

(*Continued on page* 149)

THEY CALL IT "Gumption" UP IN VERMONT

THE down-East Yankee says a man has "gumption" when he does a hard job skillfully . . . and profitably.

Foundry-men depend on MOGUL and KORDEK to produce money-making castings. You get mighty few discards when you use these two reliable binders.

MOGUL is a perfect Green Bond, which increases permeability in cores. Use MOGUL in cores for both green and dry strength.

MOGUL works with core oil; it decreases drying time and yields smooth cores. MOGUL works perfectly with pitch or resin, too, because cores can be handled while still warm. MOGUL is widely used with sharp sands.

Team up with MOGUL and KORDEK — you can depend on them.

KORDEK

KORDEK is a perfect DRY BOND which can be used in smaller quantities than most dry binders. KORDEK produces better castings with fewer discards.

CORN PRODUCTS SALES CO. 17 BATTERY PLACE NEW YORK 4, N. Y.

Consistently GOOD!

The mongoose is not immune to snake poison, yet it will attack even a king cobra at the drop of a hat. It depends upon its extraordinary agility, its quick sight and its daring. The mongoose HAS to be *consistently* good; he can't afford to be otherwise.

LINBOND

LINBOND is consistently good, too. Developed in our own laboratories, and tested in foundries throughout the country, it set an enviable mark in consistency and uniformity. Clear in color and clean to work with, it reduces core losses and brings costs to a new low figure. Since its inception and introduction, LINBOND has lived up to all its expectations; it is consistently good; it can't afford to be otherwise.

UNITED OIL MFG. CO.

1429 WALNUT STREET • ERIE, PENNSYLVANIA

(*Continued from page* 146)

all of the details of the affair.—*Leroy G. Stanzel, reporter.*

Editor's Note: A report on the Feb. 8 meeting of the Texas Chapter, published in the April issue, attributed to E. T. Kindt, Kindt-Collins Co., Cleveland, the statement that there is only one patternmaker per hundred thousand population in the United States. This should have read that there is only one patternmaker for each 10,000 population in the Western Hemisphere.

Cincinnati

REGULAR monthly meeting of the Cincinnati Chapter of the A.F.A., held April 9 at the headquarters of the Engineering Society, was attended by 110 members and guests. William A. Rengering, chapter chairman, presided. An interesting film, "Magnesium, The Metal From the Sea," was shown, which gave a history of the development of magnesium in the laboratory, through the production plants, and conversion to the finished product as it is being used in airplanes and in homes. This film is produced by Dow Chemical Co., and its magnesium plant in Texas was shown as well as the processes used in the plant.

William W. Rose, executive vice president, Gray Iron Founders' Society, Washington, addressed the chapter. His subject was "The Gray Iron Foundry—Present and Future." He discussed the main difference between the Gray Iron Founders' Society and the American Foundrymen's Association and how they complement each other. He pointed out that their fields do not overlap, that the A.F.A. is primarily one of development and research, and the Gray Iron Founders' Society continuing from that point in the marketing of gray iron.

Mr. Rose indicated the extent to which gray iron is used throughout the country, and its application in war production. He described the functions of his office in the society in liaison work between the war agencies of the government and the gray iron industry and made many suggestions for the postwar period, pointing the way to profitable operation for the future. Mr. Rose's talk was very interesting and one which is recommended to other chapters of the A.F.A.—*Joseph Schumacher, secretary.*

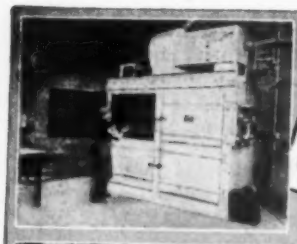
Western Michigan

APRIL 9 meeting of the Western Michigan Chapter of the A.F.A. was held at the Hotel Ferry, Grand Haven, Mich., with 120 members and guests present. After a *steak* dinner, the chapter heard James H. Smith, general manager, and Stuart D. Martin, production manager, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich.

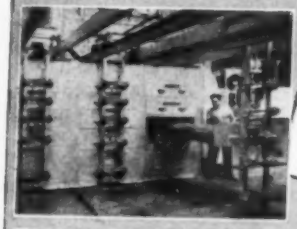
The program was a talk and demonstration entitled "Progress With Better Methods and Motion Study." An actual demonstration was presented which consisted of actually making cores, showing the old method previous to the ap-

(*Continued on page* 152)

TEXAS FOUNDRYMEN: *Pleasure was combined with business at the April meeting of the Texas Chapter, A.F.A., at the Lufkin Country Club, Lufkin, Tex. A southern barbecue and entertainment followed the technical meeting*

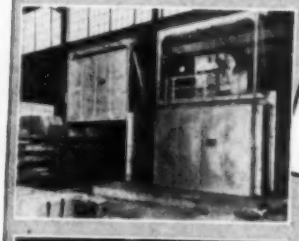


COLEMAN Portable Core Ovens

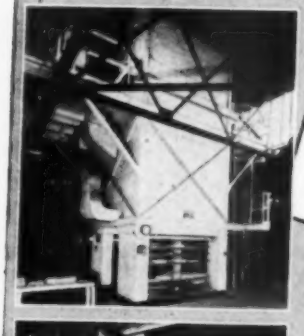


COLEMAN Rolling Drawer Ovens

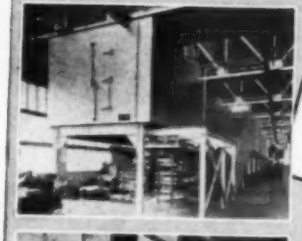
COLEMAN Transrack Ovens



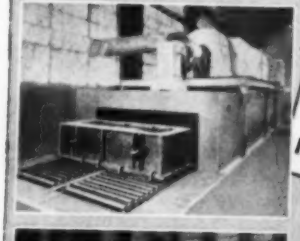
COLEMAN Car Type Ovens



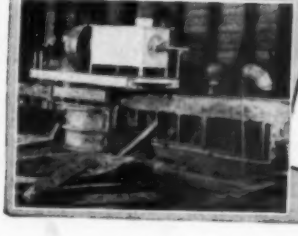
COLEMAN Tower Ovens



COLEMAN Horizontal Conveyor Ovens



COLEMAN Conveyor Mold Ovens



COLEMAN Portable Mold Dryers

READ what

THE COOPER-BESSEMER CORPORATION

MACHINERY BUILDERS SINCE THE YEAR 1833

ENGINES AND COMPRESSORS

GROVE CITY, PA.
March 21, 1944

The Foundry Equipment Company
Cleveland, Ohio

Attention: Mr. J. M. Fitzwilliam, Vice Pres.

Gentlemen:

We are pleased to have your letter of March 10, with reference to the new Coleman Mold Ovens you are installing in our foundry.

The first of these large units, which was completed some six weeks ago and has been in continuous operation since, is really doing a remarkably fine job for us. We are happy to say that we have completely eliminated all drying variables since putting this oven in operation.

We dry an average of 30 large Diesel Cylinder Head molds per day in this unit, and at this writing have not lost one casting due to drying conditions. This also means that we have not had to scrap any molds due to over-drying, or re-heat any molds due to under-drying.

Savings effected in shortened drying cycle, absolute uniformity in mold drying, and elimination of mold and casting scrappage will definitely pay for this oven in a very short time. We are exceedingly anxious now to complete our four additional large ovens, and are confident that these installations will prove just as satisfactory and effect just as many savings as the installation referred to above.

Trusting that this information will assure you of our complete satisfaction with these mold drying ovens, and with kindest personal regards, we are,

Very Cordially Yours,

THE COOPER-BESSEMER CORPORATION

G. Johnstone

G. Johnstone,
Foundry Superintendent

GJ:MLL

The FOUNDRY EQUIPMENT Co.

BUILDERS OF COLEMAN AND VARTY

CLEVELAND 13, OHIO,

at Cooper-Bessemer says about COLEMAN CORE AND MOLD OVENS

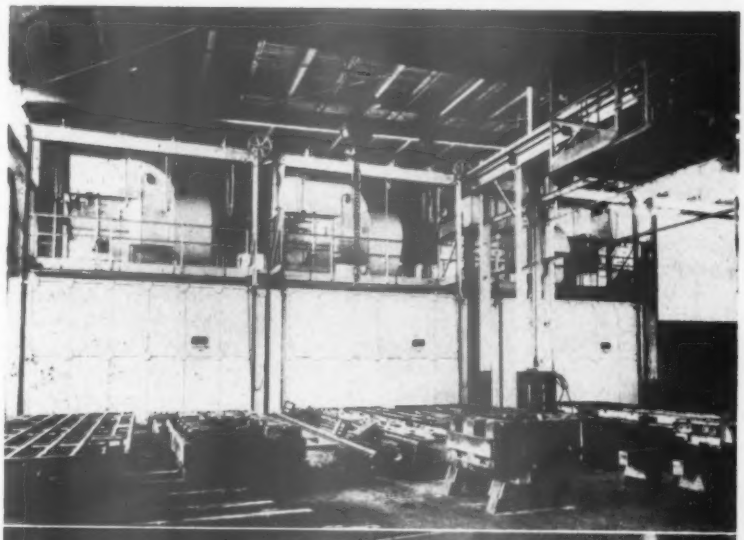
● This report is typical of hundreds of enthusiastic indorsements of Coleman Oven performance.

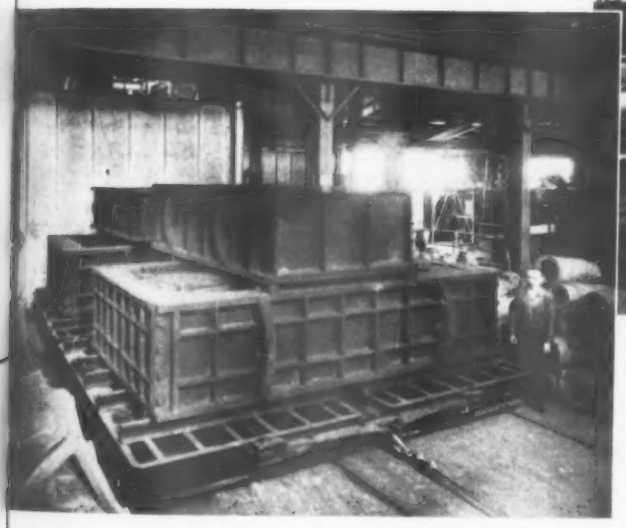
Coleman Ovens are famous for *faster operation, better baking and drying* with *less fuel and less labor.*

Coleman Oven achievements are the result of engineering research and experience gained in over 40 years of specialization and development. Over 8,000 successful installations!

Coleman Core and Mold Ovens are built in all types and sizes to meet every operating requirement.

Write for Folio of Bulletins





These photographs show part of more than 20 large Coleman Core and Mold Ovens in operation at Grove City, Pa. and Mt. Vernon, O. plants of Cooper-Bessemer Corporation.

Company
VARTWOUT OVENS
HIO, U. S. A.

COLEMAN CORE AND MOLD OVENS

(*Continued from page* 149)

plication of better methods and the revised method after the application of the time and motion study. The program was well received by the membership.—*C. H. Cousineau, program chairman.*

New Jersey

GRAY iron foundrymen must make every effort to get their industry on a more profitable basis if they are to compete successfully for postwar business, Howard F. Taylor, Naval Research Laboratory, Washington, told members of the New Jersey Foundrymen's Association at their regular monthly meeting in the Newark Athletic Club, April 23. The gray iron industry to date, he said, has not made enough money to carry on fundamental research and thus to fully explore properties and applications of their product.

It was his personal opinion that gray iron foundrymen, as well as the Navy, did not know enough about their castings to have exploited them as fully as they should in the present war effort. The Navy has had steel castings under investigation and close study at the laboratory in Washington for 20 years, whereas only now are they really getting into work on gray iron. He emphasized that the gray iron industry will have to produce a more uniformly better product in meeting future competition, and will have to meet increasingly rigid inspection.

M. J. Hogan, Bierman-Everett Foundry Co., Irvington, N. J., and president of the association, announced that the annual meeting, usually held in May, was scheduled this year for June, and would be the occasion for an outing, probably at a nearby country club. Details, he said, would be announced later.

Illustrating his remarks with lantern slides, Mr. Taylor discussed the practice of gating and risering as applied to all metals and directed special attention to atmospheric pressure feeding. He discussed problems of shrinkage and emphasized the importance of proper design and close co-operation between designer and the practical foundryman. The speaker believed that in most cases the actual gating layout should be done in the pattern shop. It is generally being done in steel, he asserted, and shou'd be done in gray iron. Exceptions might be certain jobbing foundries, he pointed out.

Mr. Taylor stressed that the position of risers should not be left up to those not familiar with the design of the casting, and observed that round risers were better than square or rectangular risers. He remarked that one type of riser now gaining in popularity is the Washburn riser or the so-called "knock off" riser; also gaining greater appreciation are swirl gates, he added.

He discussed the insulation of risers for nonferrous metals, outlining materials used and their applications. He observed that so far adequate insulation for steel casting risers has not been developed.

He predicted that some day X-ray will be used as extensively in gray iron and nonferrous foundries as is now the case in steel casting plants. He recommended that foundrymen correlate their ideas on procedure in casting and use of test bars and act more in unison in making their suggestions.—*Ben K. Price.*

Quad-City

AT THE April 16 meeting of the Quad-City Chapter of the A.F.A., 82 members and guests assembled at Hotel Fort Armstrong, Rock Island, Ill., for an excellent program covering casting defects. Following dinner, S. E. McGinty, Firegan Sales Co., Chicago, showed a moving picture entitled "Bottom Pour Ladle Practice," and made brief comments concerning preparation of the ladles and tapping devices.

Feature of the evening was a round-table discussion of scrap castings, led by two active members of the A.F.A. Committee on Casting Defects. Chairman of the committee, W. A. Hambley, Allis-Chalmers Mfg. Co., Milwaukee, and committee secretary, A. S. Klopf, Firegan Sales Co., showed a large number of slides illustrating all types of defects common to the industry. It was stated that a total of 32 classifications has been made to cover the various types of scrap. Mr. Hambley outlined the work of the committee for the past 5 years. In closing he stated that moisture is the largest single cause of foundry scrap. He also reported that many foundrymen neglect to find the basic cause of defects before looking for the remedies.

Chapter Chairman R. E. Wilke presided during the evening. Announcement was made of the annual picnic to be held at Camp Nobel, Moline, on June 16.—*H. L. Creps, secretary-treasurer.*

Chesapeake

CHESAPEAKE Chapter of the A. F. A. held its last technical meeting of the season April 25 at the Engineers' Club, Baltimore with F. G. Sefing, International Nickel Co., New York, as principal speaker.

Mr. Sefing in his talk, "A Study of Molding Methods for Sound Castings," discussed the use of knock-off risers, step risers and the use of chills, together with a thorough presentation of the problem of progressive solidification and adequate venting of the cores and molds. A lively discussion was carried on with Howard F. Taylor, technical secretary of the chapter, as the leader.

Chapter Chairman H. A. Horner introduced W. R. Bean, past national president of the A.F.A., 1920-1921, who spoke briefly on sand research. Mr. Horner also introduced Frank G. Steinebach, of THE FOUNDRY, and W. W. Rose, the Gray Iron Founders' Society.

A National Carbon Co. film, showing the manufacture of carbon and graphite

(*Continued on page* 154)

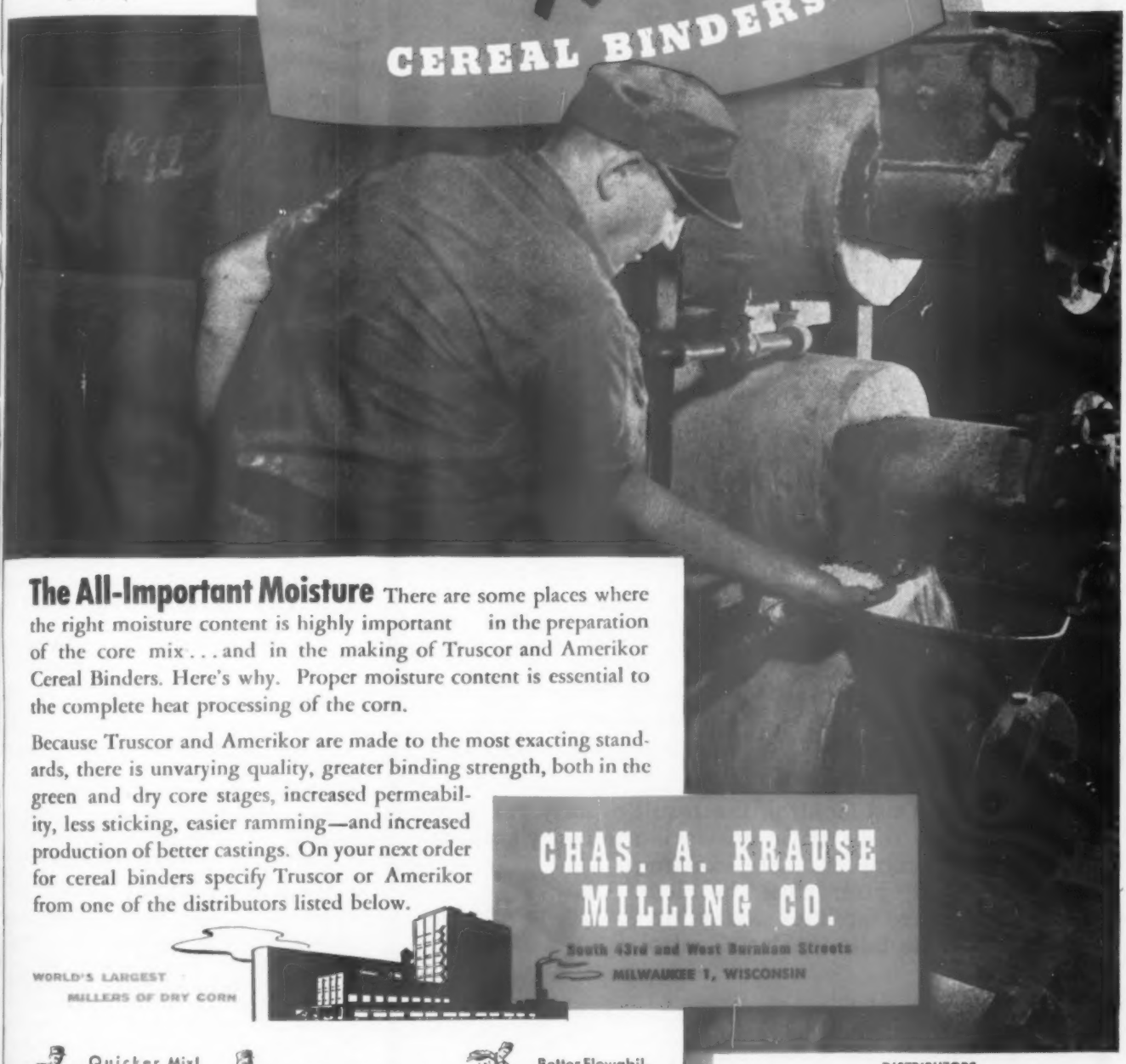
CHESAPEAKE CHAPTER: *Fred G. Sefing (right), International Nickel Co., was principal speaker at April 25 meeting of Chesapeake Chapter, A.F.A., in Baltimore. Shown at speakers table, left to right, are: W. R. Bean, Whiting Corp.; W. W. Rose, Gray Iron Founders' Society; H. A. Horner, Frick Co. Inc., chapter chairman; Mr. Sefing; J. E. Crown, U. S. Navy Yard; E. W. Horlebein, Gibson & Kirk Co.; Frank G. Steinebach,* THE FOUNDRY

KRAUSE

Truscor (Light Weight) AND Amerikor (Heavy Weight)

CEREAL BINDERS

A series of tempering stands like these give the dry corn the right moisture content for complete gelatinization—greater binding properties.



The All-Important Moisture There are some places where the right moisture content is highly important in the preparation of the core mix . . . and in the making of Truscor and Amerikor Cereal Binders. Here's why. Proper moisture content is essential to the complete heat processing of the corn.

Because Truscor and Amerikor are made to the most exacting standards, there is unvarying quality, greater binding strength, both in the green and dry core stages, increased permeability, less sticking, easier ramming—and increased production of better castings. On your next order for cereal binders specify Truscor or Amerikor from one of the distributors listed below.

CHAS. A. KRAUSE MILLING CO.

South 43rd and West Burnham Streets

MILWAUKEE 1, WISCONSIN

WORLD'S LARGEST MILLERS OF DRY CORN

Quicker Mix! Blends with All Binders!

Greater Green Strength! No Sag!

Better Flowability! Uniform Ramming!

No Sticking! Increased Production!

Quicker Shake-Out—Saves Time!

Better Permeability! Less Scabbing, Cold Shut, Buckling!

DISTRIBUTORS

M. A. Bell Co., St. Louis 2, Mo.
A. L. Cavedo & Son, Inc., Richmond 21, Va.
Foundries Materials Co., Hammond, Ind.
Foundry Supplies Co., Chicago 16, Ill.
J. H. Hatten, Lansdowne, Pa.
Independent Foundry Supply Co., Los Angeles 11, Calif.
Marthens & Co., Moline, Ill.
Carl F. Miller & Co., Seattle 4, Wash.
Miller & Zehrung Chemical Co., Portland 9, Oregon
Milwaukee Chaplet & Mfg. Co., Milwaukee 4, Wis.
Pacific Graphite Works, Oakland 8, Calif.
Porter-Warner, Chattanooga 2, Tenn.
Smith-Sharpe Co., Minneapolis 14, Minn.
Frederic B. Stevens, Inc., Buffalo 12, N. Y.
Frederic B. Stevens, Inc., Cleveland 14, Ohio
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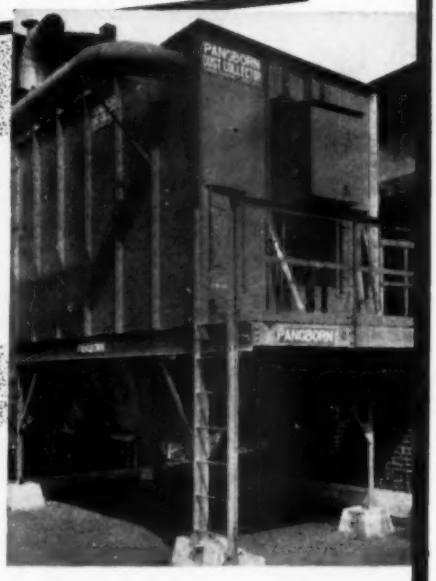
DUST CONTROL

A MIGHTY FORCE IN WAR PRODUCTION



● Dust Control *is* "a mighty force in war production,"—a silent partner to the mammoth machines, roaring furnaces, striving men and women. Behind the scenes in thousands of war plants and arsenals, that intrepid guardian —Dust Control—is doing a man-size job in keeping the ravages of industrial dust, soot and grime from vital machines, materials and workers.

● Such an important job as this must be complete. There is no room for partial Dust Control—for a job half done. That is too costly to meet the demands of modern industrial progress.

● Pangborn Dust Control, the result of forty years experience and research in answering industry's needs, will assure complete and exacting coverage for *your* dust problem. Use Pangborn facilities today and be sure of the best in Dust Control.

"Pangborn Dust Control is Protection for Production"

PANGBORN

WORLD'S LARGEST MANUFACTURER OF DUST COLLECTING AND BLAST CLEANING EQUIPMENT

PANGBORN CORPORATION · HAGERSTOWN, MD.

(*Continued from page* 152)

electrodes, was presented and well received by the members.

The nominating committee proposed the following names for officers for the coming year: Chairman, Howard F. Taylor, Naval Research Laboratory, Washington; vice chairman, David Tamor, American Chain & Cable Co., York, Pa.; technical secretary, Dr. Blake Loring.

Nominees for directors for 3-year terms include: H. A. Horner, Frick Co., Waynesboro, Pa.; J. B. Mentzer, Wood-Embly Corp., Waynesboro, Pa.; G. L. Webster, Baltimore Polytechnic Institute, Baltimore.—*Erle J. Hubbard, reporter.*

Chicago

FACT that V-E Day threatened for a few hours at least to fall on Monday, May 7, the date of the May Meeting of the Chicago Chapter, A. F. A., operated in no wise to restrict attendance or dislocate the program which had been arranged for the chapter's concluding meeting of the 1944-45 season. Apparently foundrymen through the rigors of their profession have learned to take even such momentous events as ending of a war with equanimity and poise.

Approximately 200 chapter members and guests attended the dinner meeting at the Chicago Bar Association, the technical program of which was the fourth in the series of group roundtables conducted this year.

Following the dinner, Chapter President A. S. Klopf, manager, iron division, Firegan Sales Co., called for the report of the membership committee. D. H. Lucas, manufacturers' representative, chairman, reported a total membership of 715 as of that date, an increase of approximately 200 in a two-year period.

President Klopf then conducted the election of officers for the coming year. No additional nominations having been received by mail or from the floor to those reported a month ago, the committee's recommendations were accepted unanimously.

New officers are: President, J. C. Gore, Chicago manager, Werner G. Smith Co., advanced from vice president; vice president, Frank E. Wartgow of Hasbrouck Haynes Engineers, business consultants, and until recently manager, employes' suggestion system, American Steel Foundries advanced from chapter secretary for the past three years; and secretary, Leslie C. Smith, Chicago district engineer, Peninsular Grinding Wheel Co. The office of treasurer, now held by Bruce L. Simpson, president, National Engineering Co., is appointive by the board of directors.

New directors for three years are: D. A. Farrell, foundry superintendent, South Works, Carnegie-Illinois Steel Corp.; Cornell G. Mate, assistant superintendent, Greenlee Foundry Co.; Dr. R. F. Thomson, metallurgist, Dodge Chicago plant, Chrysler Corp.; and Retiring President Klopf.

(*Continued on page* 157)

Number 9 of a Series: **"Looking at the 5 essential things you never see in electrodes!"**

Arc-lit Brooklyn Bridge . . . before the turn of the Century

The Light That Has Never Gone Out!

THE CARBON-ARC STREET LAMP cast its brilliant light long and efficiently over America's great bridges and thoroughfares. Then the arc blazed ahead to become one of industry's most useful tools.

But the light from the old street lamp still shines in the lesson it taught us about selecting exactly the right raw materials for making its "carbons"—forerunners of today's huge carbon and graphite electric-furnace electrodes.

Utmost care in selecting raw materials precedes the manufacture of all "National" carbon and "Acheson" graphite furnace electrodes . . . electrodes that are strongly shock resistant, uniform in size, of high electrical conductivity, and that are consumed slowly.

Raw materials selection, however, is just one of *five* essential things you *never see* in electrodes. The others are manufacturing experience, manufacturing control, continuing research and customer service. You should insist on them all in electrodes. We welcome inquiries.

The words "National" and "Acheson" and the "National" and "Acheson" Seals are registered trade-marks of National Carbon Company, Inc.

NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide and Carbon Corporation
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GENERAL OFFICES: 30 East 42nd Street, New York 17, N.Y.
DIVISION SALES OFFICES: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco
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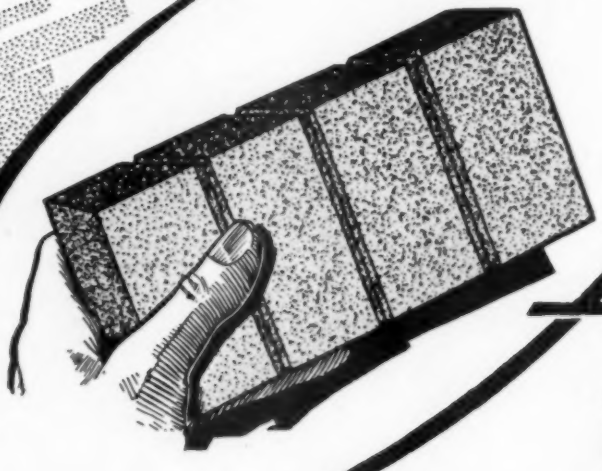
KEEP YOUR EYE ON THE INFANTRY . . . THE DOUGHBOY DOES IT!

Improved Cupola Results--



—definitely better castings!

Exclusive Scored Brick form advantages

with Famous CORNELL CUPOLA FLUX

Takes less than a minute to use, saving time and labor.

Promotes accurate measurement—correct quantity of flux per charge. You simply toss in a brick to each ton or break off a briquette (quarter section) for each 500 pounds of iron.

It does not blow out with the blast but stays in the melting zone until completely consumed.

• • •

Famous Cornell Cupola Flux is backed by over 26 years of repeat orders from America's outstanding foundries.

Good metal is clean metal. No matter how carefully you charge the cupola, the iron cannot be at its best unless impurities have been harnessed and removed before the cupola is tapped.

Famous Cornell Cupola Flux makes metal clean for but a fraction of a cent per average size casting. Can you afford not to invest such a negligible sum when this amazing flux insures sounder castings, easier, better machining, and reduced rejects and make-overs? Famous Cornell Cupola Flux also keeps cupolas clean. And the flux coating or glazing over the lining prolongs life of brick in the melting zone and gives cupola a clean drop.

The CLEVELAND FLUX Company

1026-1036 MAIN AVENUE, CLEVELAND 13, O.

Manufacturers of Iron, Brass and Aluminum Fluxes, Since 1918

FAMOUS CORNELL FLUXES
Trade Mark Registered

Write for Bulletins

Famous CORNELL ALUMINUM FLUX

Produces clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections are poured. Castings take a higher polish. NO FUMES! Exclusive formula prevents obnoxious gases. Metal does not cling to dross.

Famous CORNELL BRASS FLUX

Makes metal pure and clean, even when dirtiest brass turnings or sweepings are used. Produces castings which withstand high pressure tests and take a beautiful finish. Saves considerable tin and other expensive metals. Crucible and furnace linings are preserved.

Famous CORNELL LADLE FLUX

Place a few ounces in bottom of ladle, then tap cupola. Metal is thoroughly cleansed, foreign impurities are easily skimmed off. Ladles are kept clean, there is less patching and increased ladle life. Metal temperatures are retained during transfer to molds.

(*Continued from page* 154)

President Elect Gore informed Retiring President Klopf that he had been designated to receive the past president's statuette as a token of appreciation of his service to the chapter, but that actual presentation must be deferred until the statuette can be made available.

"Foundry Maintenance" was the topic for the Steel division round table, of which A. W. Gregg, executive engineer, equipment division, Whiting Corp., Harvey, Ill., was chairman, and John S. Townsend, superintendent of maintenance, South Works, Carnegie-Illinois Steel Corp., and Walter De Vries, superintendent, Hamler Boiler & Tank Co., were speakers.

Gray Iron division discussed "Modern Molding Methods"; H. C. Aufderhaar, metallurgist, Electro Metallurgical Co., as chairman and S. E. Langenberg, engineer, Western Foundry Co., as speaker.

W. Laird, feeder division, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., was speaker before the nonferrous division roundtable on "Progressive Solidification in Brass and Bronze Castings." H. E. Ferguson, plant superintendent, Acme Aluminum Foundry Co., was chairman.

Pattern and Malleable divisions convened jointly to consider "Advantages of Mechanization in the Foundry" and "Pattern Making Methods." Speakers were Russell J. Anderson, general superintendent, Belle City Malleable Iron Co., Racine, Wis., and Harry J. Jacobson, owner, Industrial Pattern Works. Kenneth Smith, foundry foreman, National Malleable & Steel Castings Co., and E. E. Sabey, pattern shop foreman, Miehle Printing Press & Mfg. Co., served jointly as chairmen.—*Erle F. Ross.*

Central Indiana

MAY 7 meeting of Central Indiana Chapter of the A.F.A. was held at the Athenaeum, Indianapolis, with 85 members and guests in attendance. Ralph Lee, controller, Grede Foundries Inc., Milwaukee, and a member of the finance committee of the A.F.A., was speaker of the evening.

Mr. Lee began his comprehensive talk on "Cost Systems" by giving a warning about the business era which is approaching, when government contracts will be cancelled and civilian contracts will begin. Close observation of operating expenses, overtime wages, and correct accounting procedure will be the essentials of success in the postwar era. The speaker pointed out the disadvantage of foundries quoting on a "flat price" basis for all types of castings. A discussion was held as to the relative advantage or disadvantage of quoting prices on a piece or pound price.

Announcement was made of the election results, chapter officers for the coming year to be as follows: Chairman, Ray S. Davis, National Malleable Steel Cast-

(*Continued on page* 160)

Morton's SALT TABLETS

NOW AS FAMILIAR AND NECESSARY AS THE LUNCH CART . . .

It's easy to remember the time when only one plant in twenty dispensed salt tablets to employees who sweat. Today, virtually all of the country's leading manufacturers provide them continuously.

Sweat robs the body of vital salt . . . causes Heat-Fag, inalertness, heat prostration. Workers become tired, easily fatigued. Accidents rise. Production drops.

Salt Tablets are the simple, easy way to replace this salt lost through sweat. An Industrial "must", they are a safeguard against fatigue, an aid to production, a builder of employee health and morale. The cost is less than a cent a man per week to have them available at every drinking fountain.

In salt tablets, as with other grades and types of salt, Morton is the recognized leader. Order Morton's Salt Tablets and Dispensers from your distributor or directly from this advertisement. Write for free folder today . . . Morton Salt Company, 310 S. Michigan Ave., Chicago 4, Illinois.

MORTON'S DISPENSERS

They deliver salt tablets, one at a time, quickly, cleanly—no waste. Sanitary, easily filled, durable.

800 Tablet size - - $3.25

MORTON'S SALT TABLETS

Morton's Salt Tablets are available either plain or with dextrose.

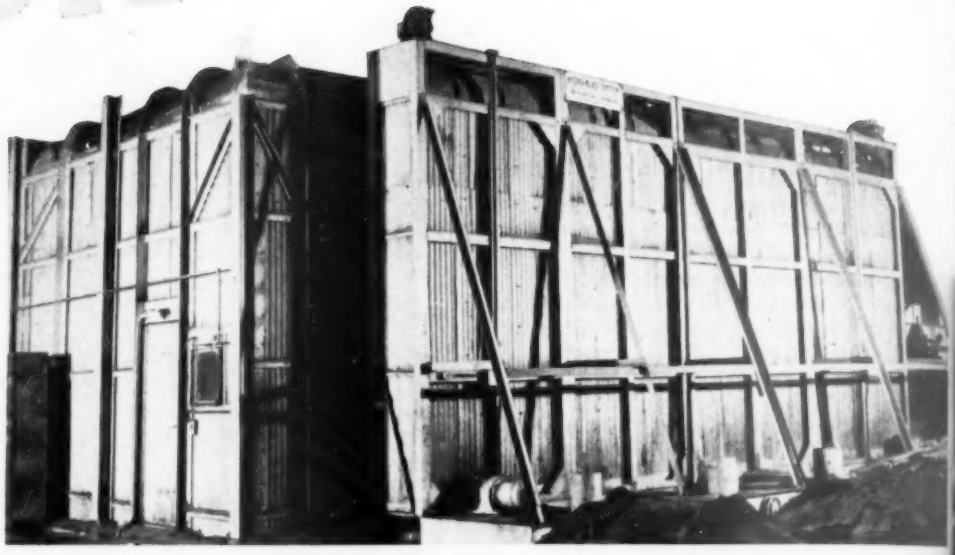
Case of 9,000, 10-grain salt tablets - - - - - - - $2.60

Salt Dextrose Tablets, case of 9,000 - - - - - $3.15

MORTON'S SALT TABLETS

it's HYDRO-BLAST at ERIE FORGE

FOR ECONOMY AND IMPROVED WORKING CONDITIONS



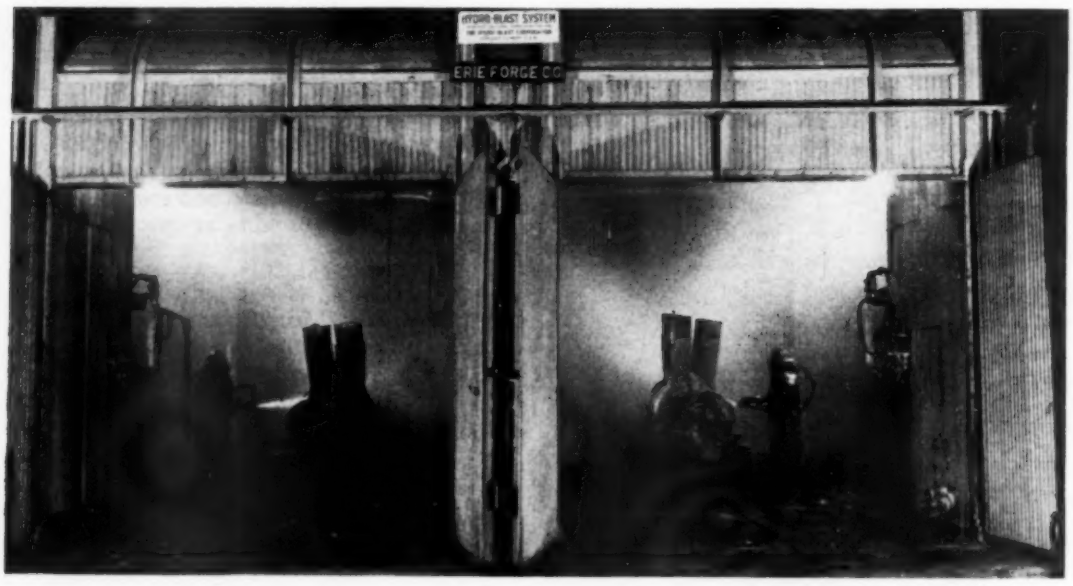
Front view of Hydro-Blast room at Erie Forge showing hangar type doors.

The 2-gun Hydro-Blast at Erie Forge Company, Erie, Penna., is more than exceeding the most optimistic hopes of the management of this prominent steel foundry.

IMPORTANT ANNOUNCEMENT!

Due to confusion in publication dates, the Hydro-Blast Name Contest has been extended to June 20 in fairness to all competitors.

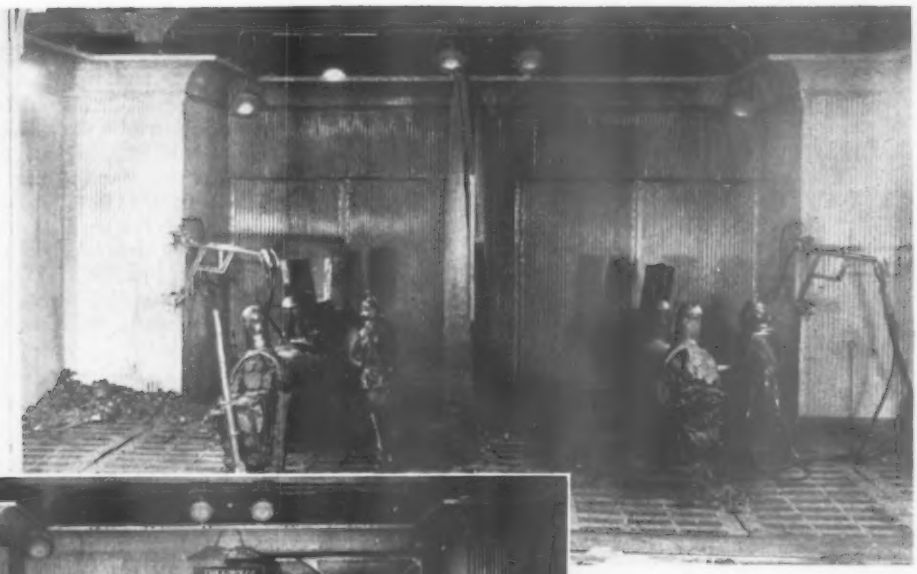
The date of the announcement of the winners cannot be set at this time.



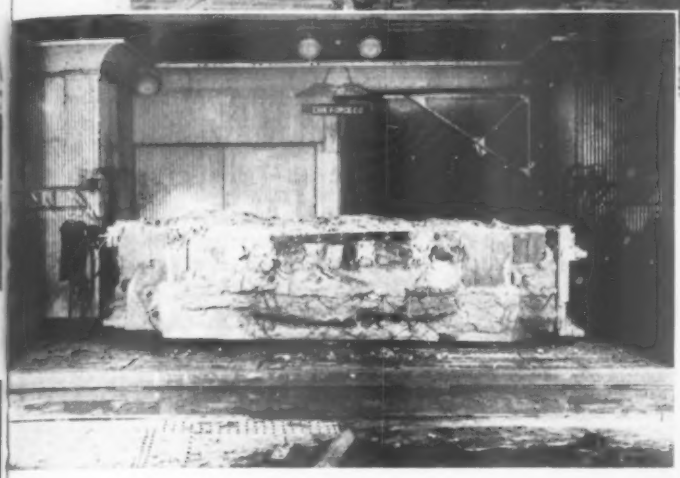
Rear view of Hydro-Blast room at Erie Forge showing 2-gun cleaning operation.

2550 N. WESTERN AVE.

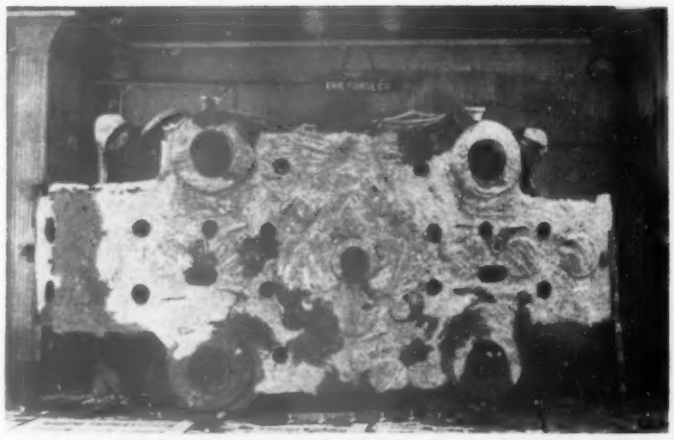
HYDRO-



Front view of Hydro-Blast room at Erie Forge showing 2-gun cleaning operation.



View of castings in Hydro-Blast room at Erie Forge before Hydro-Blasting.



Another larger steel casting to be cleaned by the Hydro-Blast method of wet sand and water velocity.

Men Are Important Too

The management of the Erie Forge Company considers not only the technical and economical aspects of making castings, but also the working conditions which encourage the best effort from their employees. Known throughout the world as producers of large and intricate steel castings, the Company shows an exceptionally low absentee record because it is always endeavoring to improve working conditions.

The installation of Hydro-Blast represented another effort to make the Erie Forge foundry a more satisfactory and attractive place to work. This new method eliminates the dusty, noisy operations of core knock-out and surface cleaning through the suppression of dust at its source and the disposal of used sand.

-BLAST

CHICAGO 48, ILLINOIS

A CONVEYOR-COORDINATED PLANT that you can be proud of!

ARE you satisfied with your present production plant? Does material or goods in process flow smoothly with the least disorder, loss of time, waste of space or man-power?

If there is room for improvement, isn't it a matter of better coordination—better linking of all the steps involved from receiving — to shipping?

Whether your rate of manufacture is several hundreds a minute or one an hour, Standard builds conveying equipment to meet the situation.

The range and versatility of Standard Conveyor equipment are the result of nearly 40 years of close contact with inside-the-plant transportation — in plants large and small, making products as widely diverse as steel or cosmetics. The benefit of this experience is available to you, without obligations. The counsel of Standard Conveyor engineers is valuable in deciding on the right kind of conveying equipment to coordinate operations faster — for lower cost.

Write for comprehensive reference book —"Conveyors by Standard"— Catalog No. F-65

STANDARD CONVEYOR CO.

General Offices: North St. Paul 9, Minn.

Sales and Service in Principal Cities

(*Continued from page* 157)

ings Co., Indianapolis; vice chairman, J. P. Lentz, International Harvester Co., Indianapolis; treasurer, Harold Henniger, International Harvester Co., Indianapolis; secretary, Robert Langsenkamp, Langsenkamp Wheeler Brass Works Inc., Indianapolis. Directors elected include H. H. Lurie, Cummins Engine Co., Columbus, Ind.; W. Tragarz, International Harvester Co., Richmond, Ind.; G. C. Dickey, Harrison Steel Castings Co., Attica, Ind.; and L. Snyder, Hickman, Williams Co., Cincinnati.

This was the last meeting of the season until September.—*Robert Langsenkamp,*

Rochester

APPROXIMATELY 75 members and guests attended the meeting of the Rochester Chapter of the A.F.A., held at the Hotel Seneca, April 13. Included in the group were representatives of about 30 companies in the Rochester and Buffalo area, and a large number of patternmakers were present. Leonard F. Tucker, City Pattern Works, South Bend, Ind., presented an interseting talk, his subject being "Co-operation Between the Patternmaker and the Foundry."

Mr. Tucker supplemented his talk with lantern slides to emphasize important points, and the audience entered into the spirit of the meeting with numerous questions which brought out information of value. Collaboration between the engineer, the patternmaker and the molder was recommended, and the speaker stressed the point that no matter how exactly a pattern may be constructed in harmony with the drawing design, the pattern is not constructed correctly until it produces an acceptable, saleable casting. He also pointed out how important it is for the patternmaker to keep in mind the molder's problems during construction of patterns.

More than 100 members and guests of the chapter gathered at the Hotel Seneca for the dinner meeting held May 11 to hear Norman L. Smith, Link Belt Co., Philadelphia, whose talk on "Mechanization and Modernization" was extremely interesting and enlightening.

James E. McHenry of Gleason Works was honored for having reached the 50-year mark of service to the foundry industry. Mr. McHenry was presented with a beautiful A.F.A. 50-year pin which was supplied through the efforts of Robert Kennedy of the national office of the A.F.A., and Frank Wartgow of the Chicago Chapter. All present extended their good wishes for Mr. McHenry's continued good health and happiness.

The nominating committee's selection of candidates was accepted unanimously and the new officers for the 1945-1946 season are as follows: President, Walter F. Morton, Anstice Co. Inc.; vice president, Walter G. Brayer, Bausch & Lomb Optical Co.; secretary-treasurer, Carl B. Johnson, Symington-Gould Corp. Directors include David D. Baxter, Sterling

(*Continued on page* 162)

Do You Get Scabs, Cuts or Buckles on Your LARGE Iron Castings?

¶ If so, they are probably due to low hot strength or to a brittle sand at high temperatures.

BALANCED REVIVO

may be the answer to your problems.

¶ Balanced Revivo is specially compounded for large iron castings from 1 ton to 150 tons. It has moderately high green strength, very high dry strength and extraordinarily high hot strength.

¶ Equally important, it is thermoplastic; that is, it softens at high temperatures and makes an extremely tough, resilient sand which resists buckling and cope pull-downs.

¶ If you have never used BALANCED REVIVO on large work, *write for our bulletin.*

Remember, please, that ECP service engineers have *five* different bonding clays and their many combinations from which to give you the one right recommendation and to assure you of receiving the *most bonding strength per dollar.*

EASTERN CLAY PRODUCTS, INC., EIFORT, OHIO

DIXIE BOND • BLACK HILLS BENTONITE • REVIVO BOND • REVIVO SUPER BOND • BALANCED REVIVO

ECP *All* TYPES OF BONDING CLAYS

A Foundry Sand Service Based Upon Practical Research

(*Continued from page* 160)

Wheelbarrow Co.; Neal F. Clement, Rochester-Erie Foundry Corp.; M. T. Ganzauge, General Railway Signal Co.; L. C. Gleason, Gleason Works; Henry B. Hanley, American Laundry Machinery Co.; Herman G. Hetzler, Hetzler Foundries Inc.; Irving B. Rosenthal, Rochester Smelting & Refining Co.; and Ernest N. Van Billiard, Progressive Foundry Works Inc.—*Carl B. Johnson, secretary-treasurer.*

Twin City

CHAIRMAN A. M. Fulton conducted the April 24 meeting of the Twin City Chapter, at which E. H. Schleede, development engineer, United States Gypsum Co., presented a detailed discussion of the application of gypsum to foundry practice. He was assisted by G. C. Holbrook, district engineer for the same company and member of the local chapter. Visiting members and guests included Earl W. Manning, Manning Pattern Company, Waterloo, Iowa; Joe G. Risney, International Molding Machine Co., and S. E. Shaver, Werner G. Smith Co, both of Milwaukee; and W. J. Knapp, Modern Equipment Co., Port Washington, Wis.

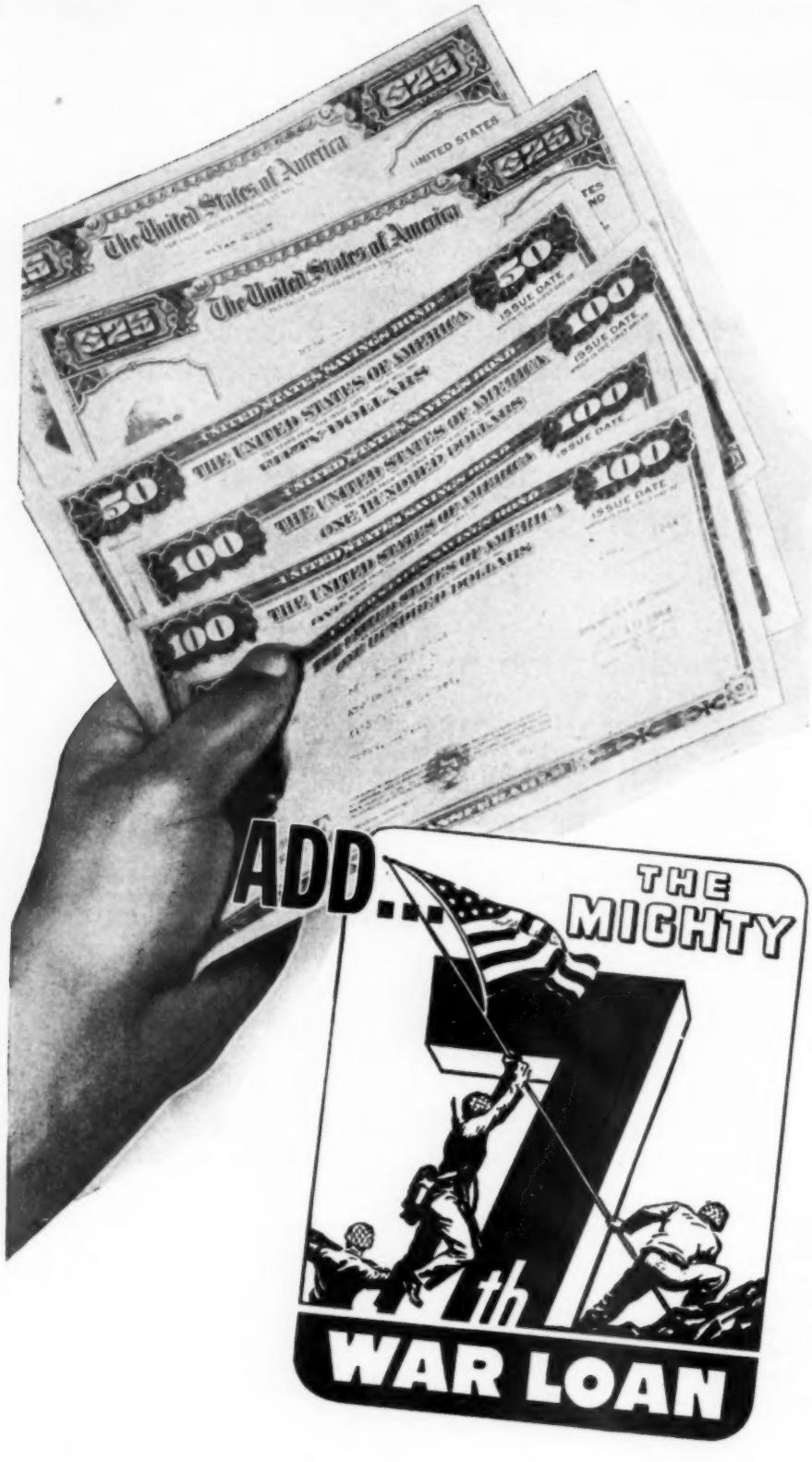
In a brief business session several changes in the by-laws were approved and the following were elected to hold office for the 1945-46 season: Chairman, R. C. Wood, Minneapolis Electric Steel Casting Co.; vice chairman, H. M. Patton, American Hoist & Derrick Co.; secretary-treasurer, Alexis Caswell, Manufacturers' Association of Minneapolis Inc.; directors for three years, H. J. Bierman, Acme Foundry Co., A. M. Fulton, Northern Malleable Iron Co., and Sheldon P. Pufahl, Paul Pufahl & Son Foundry Co.; director for two years, Clifford Anderson, Crown Iron Works Co.

Mr. Schleede divided his talk into applications of gypsum to pattern construction and use of gypsum as a mold material. Using a sound-film strip entitled "Tomorrow's Patterns," he illustrated the uniformity of size and shape of plaster patterns throughout a range of temperature and humidity conditions. The condition in which the plaster could be troweled and worked with a spatula was particularly interesting and illustrated the possibilities of forming odd patterns, unusual details, or building models for study in conferences between foundrymen, patternmakers, and engineers.

In answer to a number of questions, Mr. Schleede said that plaster patterns could be used on jolt machines if the pattern were properly reinforced and supported, and that sandslingers could be used. It was suggested that plaster be used primarily for master patterns or for medium runs. Wax could be cast in gypsum molds and cores could be blown if a hard plaster had been used.

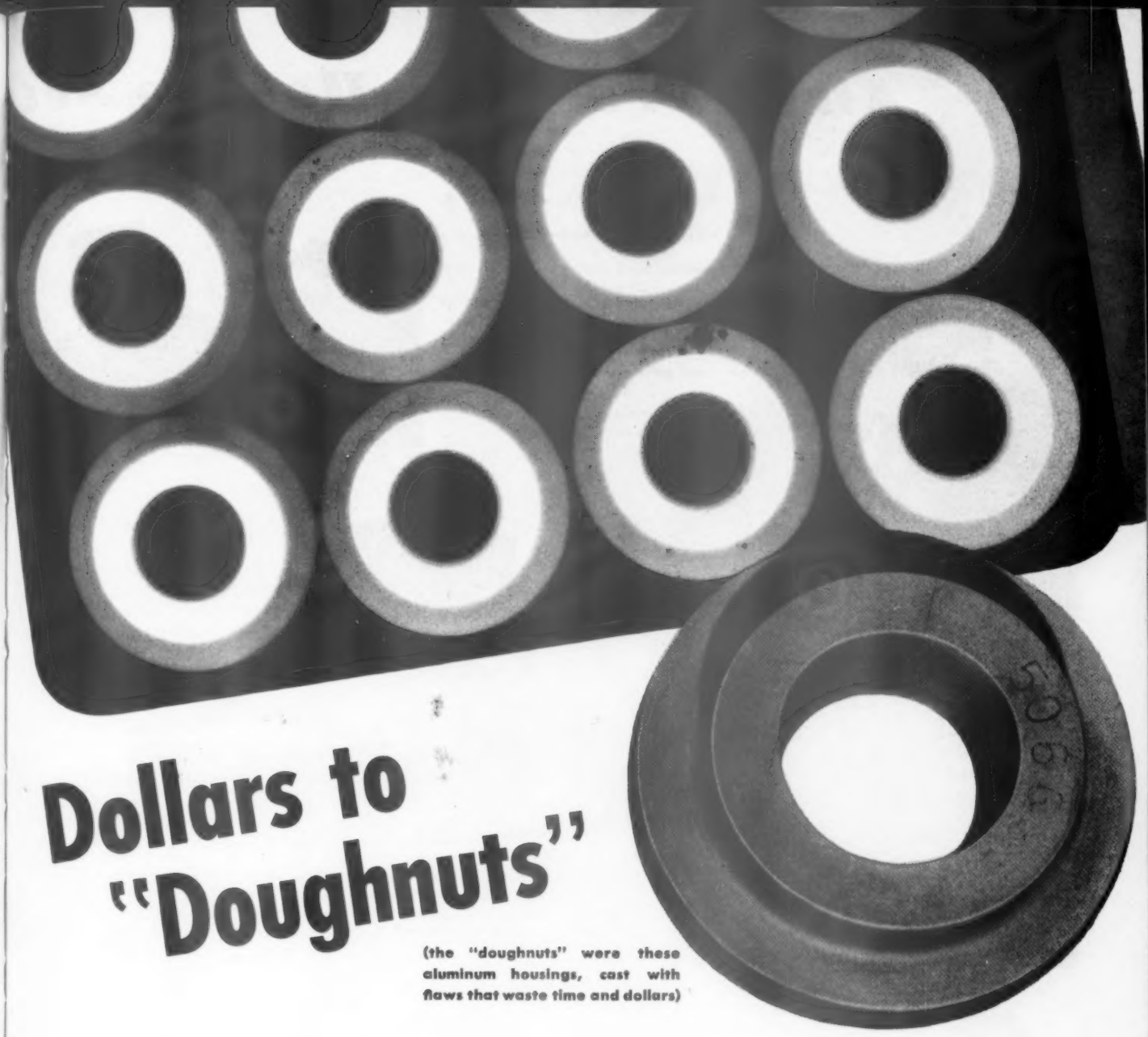
In the second part of his talk, Mr. Schleede described the various techniques for using gypsum as a mold material. A completely dehydrated mold is neces-

(*Continued on page* 166)



A War Bond Message Designed and Contributed by Buell Engineering Company, Inc., New York

buell
DUST RECOVERY SYSTEMS



Dollars to "Doughnuts"

(the "doughnuts" were these aluminum housings, cast with flaws that waste time and dollars)

RADIOGRAPHY reduced rejection from 18% to less than 1%

HERE again is an "inside story" of X-ray at work . . . of its ability to control the quality of parts . . . and improve manufacturing technic . . .

Simple aluminum housings—ordered from a foundry—were radiographically inspected on receipt . . . with immediate rejection of 180 in every 1000.

Disastrous? No, for the fact that these flaws were discovered *before* machining meant valuable savings in time (of workers and machines), money, materials. And the best was yet to come . . .

The radiographs—showing irregularities—were referred back to the foundry. Careful study suggested a new technic. Rejections on further deliveries dropped from 18% to less than 1%.

Teamwork—that's the keynote of this case history . . . with customer, foundry, and X-ray working together toward greater efficiency, increased production. Time and again—in widely divergent industries—Radiography proves its worth . . . analyzing . . . inspecting . . . correcting . . . improving . . . eliminating waste . . . lowering costs . . .

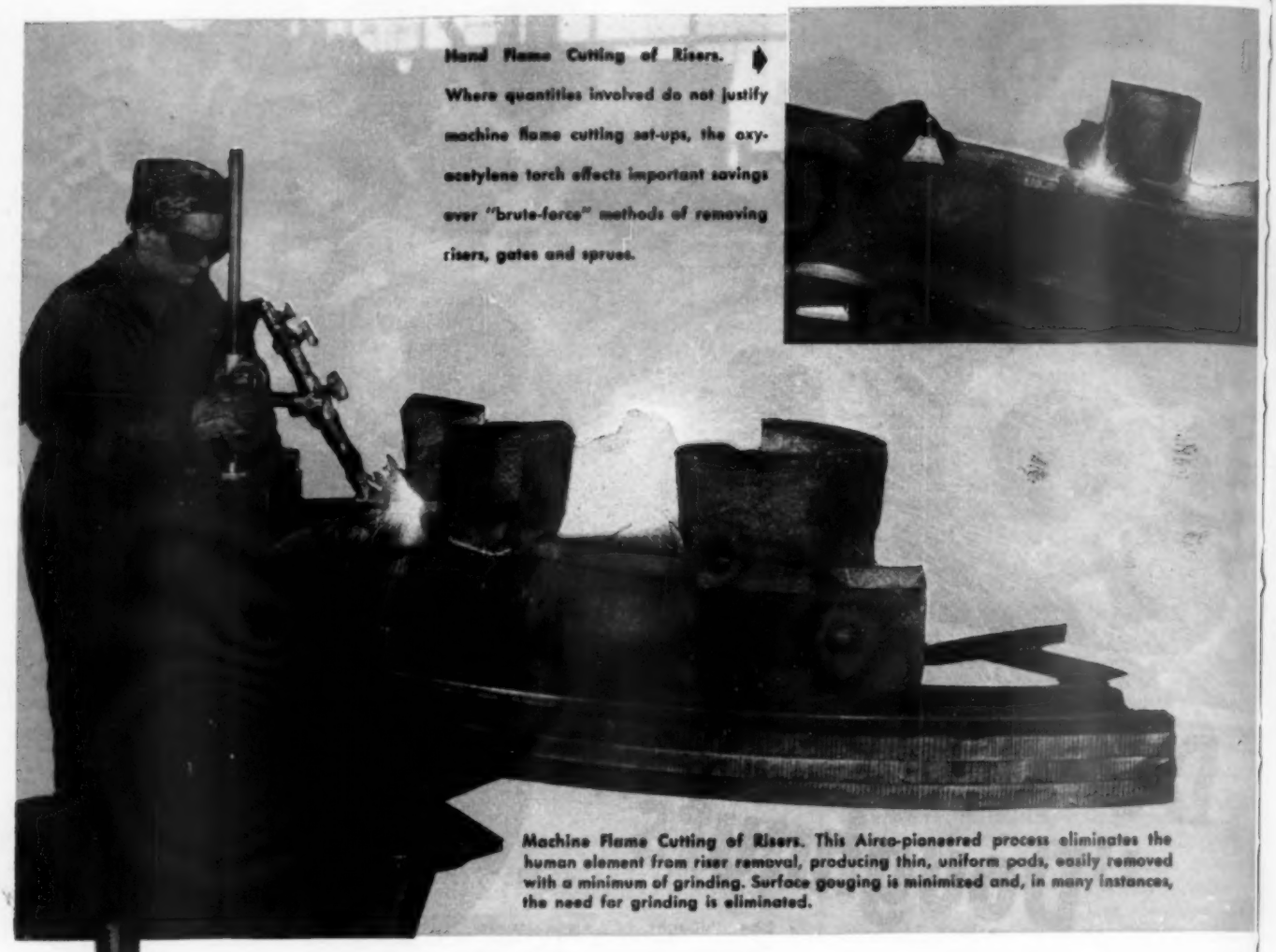
Radiography as an industrial tool has proved its ability to help industry meet present-day requirements. It can be depended upon to do as much in the future. Eastman Kodak Company, X-ray Division, Rochester 4, N. Y.

RADIOGRAPHY

Analyzes . . . Instructs . . . Corrects . . . Improves

Kodak

Airco Processes Help to Set



Hand Flame Cutting of Risers. Where quantities involved do not justify machine flame cutting set-ups, the oxy-acetylene torch effects important savings over "brute-force" methods of removing risers, gates and sprues.

Machine Flame Cutting of Risers. This Airco-pioneered process eliminates the human element from riser removal, producing thin, uniform pads, easily removed with a minimum of grinding. Surface gouging is minimized and, in many instances, the need for grinding is eliminated.

Thoroughly familiar with foundry operations through long years of service to the industry, Airco engineers have worked unceasingly to develop better methods of performing operations recognized as bottlenecks in wartime steel casting production. From this work have come new and improved practices which helped foundries set new production records and which point the way to more profitable post-war operations.

These processes, illustrated here, and others such as flame hardening, maintenance welding and hardfacing of equipment subject to wear, are described in detail in the booklet "New and Improved Oxyacetylene Methods for Steel Foundries". Copies may be obtained from the nearest Airco field office or by writing to Dept. F at the general offices in New York.

Airco's Applied Engineering Department will be glad to assist you in applying these modern methods to your own foundry operations. 'Phone or write the Airco field office nearest to you.

AIRCO

New Casting Production Records

◀ **Flame Scarfing Riser Pads.** This new Airco-developed process burns off riser pads fifty times as fast as they can be removed by grinding — half again as fast as they can be "washed away" with the carbon arc. It produces a superior surface and can be controlled within 1/16" depth.

◀ **Flame Gouging.** Another new Airco oxy-acetylene process, removes webs and fins and gouges out defects in a fraction of the time required for chipping.

Oxygen Lancing. A ▶ faster, more economical method of tapping furnaces, cupolas and ladle nozzles, and cutting up ladle skulls, spills and heavy scrap for remelting.

◀ **A.C. Arc Welding.** This modern method quickly and smoothly fills in cavities left in castings after defects have been gouged out.

◀ **Flame Descaling.** This new Airco process descales normalized or annealed castings in one-fourth the time required with the chipping chisel — and produces a cleaner surface.

AIRCO PROCESSES FOR NON-FERROUS CASTINGS

Heliwelding — The welding arc is enveloped in an atmosphere of helium, eliminating the need for corrosive fluxes and facilitating the welding of aluminum and magnesium. **Nitrogen Fluxing** reduces pin point porosity and produces uniform, high-grade aluminum. There is no loss of magnesium in aluminum-magnesium alloys; no toxic fumes.

AIR REDUCTION

General Offices: 60 EAST 42nd STREET, NEW YORK 17, N. Y.

In Texas: MAGNOLIA AIRCO GAS PRODUCTS CO. • General Offices: HOUSTON 1, TEXAS

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PEACE FOLLOWS WAR
WITH PRODUCTION
FOR CIVILIAN USE

HAUSFELD
METAL MELTING FURNACES

...will carry their share of this vital work in the days to come

FURNACES FOR
BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS

The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

(*Continued from page* 162)

sary because plaster has no appreciable permeability. Trapped air is avoided by venting the highest parts of the mold cavity. The mold is friable in the dry state and must be handled with care. It also rehydrates rapidly and has to be used soon after coming from the oven. Plaster molds are used successfully for casting all the industrial nonferrous alloys except those containing lead, which give a bad finish.

The method of pressure casting matchplates is not patented and is not well publicized, according to the speaker. The cope and drag, both made of well dried plaster, are separated by a transite spacer, of the thickness of the plate being made. The metal in a mushy state is poured into a cylinder the bottom of which is asbestos paper. About six or seven pounds per square inch air pressure applied at the top ruptures the asbestos paper and forces the metal into the mold cavity. There is no appreciable shrinkage because of the low temperature and the pressure feeding.

Successful casting of high melting alloys requires use of the ethocel-silicate process which gives high permeability and refractoriness. The technique is comparable to dental casting practice. Wax or injection molded plastic patterns are used. As a casting process it is expensive but finds particular application for alloys or shapes that would be impossible or costly to machine. Examples of this work are turbine blades, gun parts, and parts for jet propulsion equipment. —*Herbert F. Scobie, program chairman.*

Detroit

APRIL 19 meeting of the Detroit Chapter of the A.F.A. was held at Rackham Memorial, with 125 members and guests on hand. Following the dinner a report of the nominating committee for officers and directors for 1945-46 was submitted by V. A. Crosby, Climax Molybdenum Co. Group roundtables on production problems were held, covering foundry facings, testing and inspection, and magnesium.

Dr. John A. Ridderhof, F. B. Stevens Inc., whose subject was, "Proper Applications of Facings," was speaker for the facings group, with E. C. Hoenicke, Eaton Mfg. Co., as discussion leader. Recommended applications of seacoal, core washes, compounds and facing materials were discussed and well received by the group.

"Methods of Testing and Inspection" was the subject of Don M. McCutcheon, Ford Motor Co. The speaker dealt with industrial X-ray techniques, magnetic testing and related methods of testing for steel castings. Discussion leader was G. Vennerholm, Ford Motor Co.

W. C. Newhams, Dow Chemical Co., Midland, Mich., addressed the magnesium section, discussing "Effect of Gas on Properties of Magnesium Sand Casting Alloys." Leslie Brown, Magnesium Fabricators Inc., Adrian, Mich., acted as dis-

(*Continued on page* 168)

The PATTERN SHOP

The Pattern Maker

A pattern maker is an exalted craftsman, the greatest common denominator, as well as the least common multiple, of all industrial production. A pattern maker must have the creative conception of a draughtsman designer, the practical ability of a molder, the precise skill of a machinist, the analytical judgment of a metallurgist and the specific exactness of a mathematician. He must create a plan, or design, with vision and ingenuity and build the idea from trade to trade with practical knowledge, thinking and forming inside and out with length, breadth and thickness, adjusting accurately all values and dimensions, and producing with dextrous finality any conceivable form to be cast in metal. The products of the pattern maker's skill are truly surrounded by an aura of greatness which dignifies his right to assume a place of confidence, trust and honor in all industrial advance and national progress.—*Edward Leslie*

•

With the foregoing eulogy to the patternmaker, we begin our first advertisement of a new series. "The Pattern Shop" will be, we hope, more than a series of advertisements; in it we plan to include news of new machinery, equipment and supplies; helpful hints on sound pattern-making and foundry practice; useful and educational information of various kinds. So keep your eye peeled for future issues.

Both patternmaker and foundryman will be interested in the new MASTER fillet cement, for it makes pattern work

New Fillet Cement

easier and helps produce cleaner castings. Being waterproof and heat resistant, it is impervious to the warm moisture of foundry sand, and will not pick up sand particles along the edges of fillets. Quick and easy to apply, it gives tighter adhesion on both wood and metal patterns, and will not curl the edges of wood fillets.

Like every other Kindt-Collins product, this fillet cement has been designed specifically to make *your* job easier and *your* product better. Order a supply today, and you will never return to old-fashioned methods of filleting patterns.

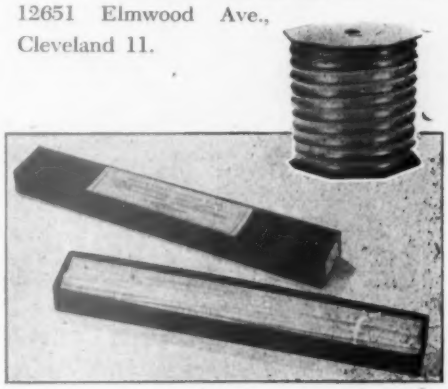
Price per qt. $2.00
Thinner, per qt. .. .50

Bull's-Eye Fillet

This is an improved plastic fillet, made of a high-melting-point material and covered with a tightly woven cotton cloth which is cut on the bias and permits the fillet to fit around sharp curves easily without snipping the edges. Comparable to leather fillet in durability and superior in adaptability, it sells for less than half the cost of leather and saves much time and labor in application. It is highly accurate in size and shape, maintains a true radius in all types of work, and holds its shape indefinitely. It is not recommended for use in extremely hot sand, but will stand the grind of hundreds of castings and will not deteriorate in storage. (For proper application, use MASTER waterproof fillet cement.) For prices, write the Kindt-Collins Co., 12651 Elmwood Ave., Cleveland, 11.

MASTER Wax Fillet

This is the highest speed and lowest cost filleting material, made of a specially compounded wax which remains fresh and pliable for an indefinite period. It sticks to either bare or coated surfaces without adhesive, bends around corners without fitting, is highly resistant to both heat and cold, and is so easy to apply that it saves two thirds of a patternmaker's time. Pattern coatings do not tend to dissolve it, but dry readily over it. For prices, write the Kindt-Collins Co., 12651 Elmwood Ave., Cleveland 11.



New Literature On Fillets

A new four-page folder on various types of fillet, including Bull's-Eye, wax composition, leather and wood, has just been issued, containing sizes and prices of the complete MASTER line, including the new fillet cement. Write for your FREE copy today.

MASTER PRODUCTS

THE KINDT-COLLINS CO.

Everything for the Pattern Shop

12651 ELMWOOD AVE. • CLEVELAND 11, OHIO

ONE SWIFT SURE STROKE

CUTS *Non-Ferrous* GATES AND SPRUES *Faster,* AT LOWER COST!

A Tessmer Sprue Cutter in your cleaning department is the logical answer to one of your most urgent problems . . . *getting out more work with less help!*

It saves man hours and cuts costs because it converts a slow, laborious hand operation into a fast, effortless machine job. It releases valuable man power for more important work.

The Tessmer method of cutting non-ferrous gates and sprues with *One Swift Sure Stroke* results in lower operating costs for two reasons: The machine itself is so sturdy and simple in construction that it requires very little maintenance. No auxiliary dust collecting system is needed to carry off fine metal particles and dust. Write for Descriptive Folder.

Milwaukee

CHAPLET AND MANUFACTURING CO.

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(*Continued from page* 166)

cussion leader on this advance presentation of gas porosity that was originally intended to be presented at the suspended 1945 Foundry Congress.—*H. H. Wilder, reporter.*

Northeastern Ohio

ANNUAL "Old-timers" night of the Northeastern Ohio Chapter, A.F.A., held May 10 at the Cleveland Club, attracted a record attendance of approximately 350 members and guests. The latter included 105 men with foundry service records of 40 or more years. Dean of this group is Ben D. Fuller, Whitehead Bros. Co., with 64 years of service, followed by G. H. Zimmerman, Eberhard Mfg. Co. Division, with 63 years; J. V. Horning, Ohio Foundry Co., 61 years; Henry M. Oehling, National Malleable & Steel Castings Co., 58 years, and E. Renk, Eberhard Mfg. Co. Division, 57 years.

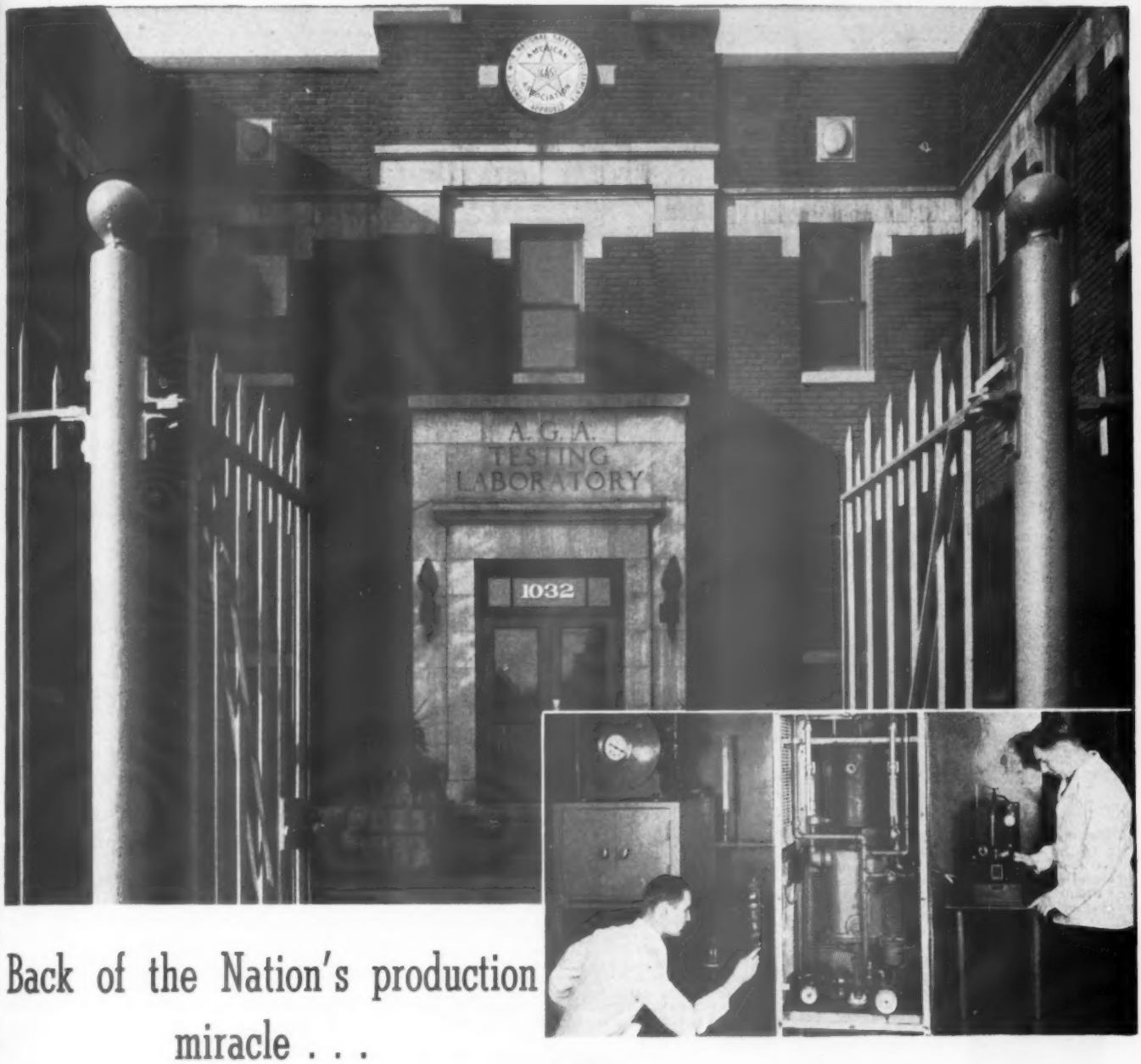
Among other guests were 20 apprentices from Cleveland Trade School and four members of the Canton District Chapter. Heading the latter delegation was K. F. Schmidt, United Engineering & Foundry Co., Canton, retiring chairman of the chapter, and the following newly-elected officers: H. G. Robertson, American Steel Foundries, Alliance, chairman; I. M. Emery, Massillon Steel Casting Co., Massillon, central area vice chairman, and Otis D. Clay, Tuscora Foundry Sand Co., Canal Fulton, treasurer.

In the absence of additional nominations for officers and directors of the Northeastern Ohio group since the report of the nominating committee at the April 12 meeting, Chairman Russell F. Lincoln instructed Secretary Gilbert J. Nock to cast a unanimous ballot for the following slate: Chairman, A. C. Denison, Fulton Foundry & Machine Co. Inc:; vice chairman, Henry J. Trenkamp, Ohio Foundry Co.; secretary, Gilbert J. Nock, Nock Fire Brick Co.; treasurer, F. Ray Fieig, Smith Facing & Supply Co., all of Cleveland. Directors elected for 3 years: Leon Miller, Osborn Mfg. Co.; Dave Clark, Forest City Foundries Co.; Tom West, West Steel Castings Co.; Edward J. Metzger, Wellman Bronze & Aluminum Co., and Frank C. Cech, Cleveland Trade School. Paul Wheeler, Link-Belt Co., was elected a director for 2 years.

Remainder of the evening was given over to an entertainment program arranged by L. P. Robinson, Werner G. Smith Co.

Patterns as the jobbing foundry sees them was the subject for technical discussion before 175 members and guests of the Northeastern Ohio Chapter at its April 12 meeting. Frank C. Cech, Cleveland Trade School, was discussion leader and William C. Manwell, superintendent, Fulton Foundry & Machine Co., was the technical speaker. Mr. Manwell's paper, in the preparation of which he was assisted by A. C. Denison, president of the same company, treated the fundamentals of pat-

(*Continued on page* 170)



Back of the Nation's production miracle . . .

Gas Research

When a new production problem comes up—and plenty have come up since the war began!—it often has developed that the answer already has been found by the designers and builders of Gas furnaces through research and experiment already done.

In addition to all the other progress in the industrial heating field, the Gas industry itself has for years been engaging steadfastly in research in its own Laboratories, in university laboratories, and in the laboratories and shops of Gas equipment manufacturers . . . and some of the results obtained are today helping to win the war—through better Gas equipment which is speeding production of armaments made of all types of ferrous and non ferrous metals and their alloys.

Busier than ever before, our Gas laboratories are almost completely devoted to war research . . . but the shortcuts to better products at constantly lowered unit costs are of intense interest to every manufacturer of post-war goods.

Ask your Gas company to keep you fully informed on new Gas techniques for reconversion and post-war application.

AMERICAN GAS ASSOCIATION
INDUSTRIAL AND COMMERCIAL GAS SECTION
420 LEXINGTON AVENUE, NEW YORK, 17, N.Y.

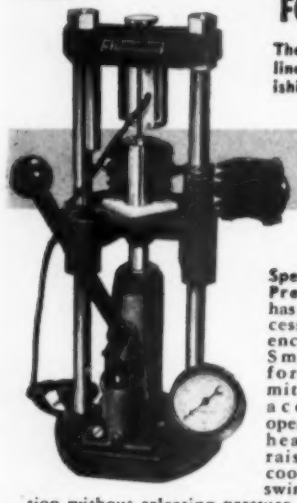
THE TREND IS TO GAS
FOR ALL
INDUSTRIAL HEATING

BUY WAR BONDS—HELP SPEED VICTORY!

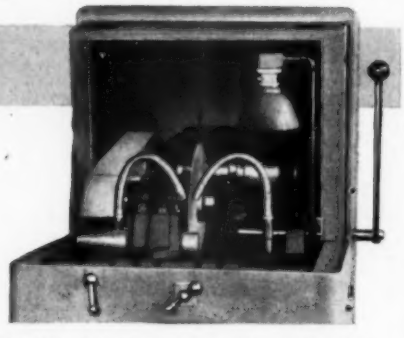
Buehler

SPECIMEN PREPARATION EQUIPMENT AND SUPPLIES FOR THE METALLURGICAL LABORATORY

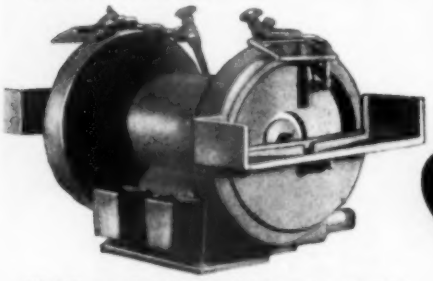
The items illustrated are selected from the complete Buehler line of equipment, tools and accessories for molding and finishing specimen mounts.



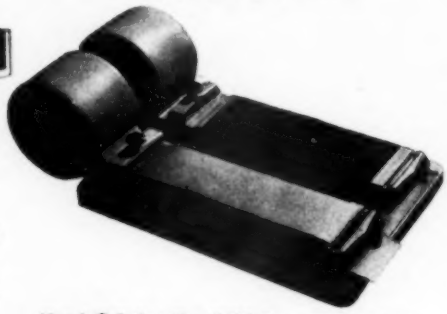
Specimen Mount Press No. 1315 has complete accessibility, no enclosed parts. Smooth performance permits speed and accuracy in operation. Solid heater can be raised and the cooling blocks swing into position without releasing pressure on the mold. This rapid cooling permits production of transoptic mounts in a few minutes. Shipping weight, 100 lbs.



Abrasive Cut-off Machine, Model No. 1000, is a solidly built, heavy duty piece of equipment free from sideplay or vibration with capacity for cutting specimen sections up to 3-1/2". Cutting is done on the front of the wheel and is controlled by a convenient outside lever. The driving motor is a totally enclosed ball bearing, 3 hp. with a separate motor driving the self-contained cooling system. Overall dimensions of cabinet 31" x 47" x 64". Shipping weight, 1400 lbs.



Wet Power Grinder No. 1210, powered with a 3/4 hp. totally enclosed ball bearing motor has two 12" water cooled wheels fitted with closed-in guards and non-shatterable shields. Suitable for coarse and medium grinding. Shipping weight, 310 lbs.



Hand Grinder No. 1410 is a most conveniently arranged two stage grinder. The grinding surfaces are 4-1/2" x 12-1/4" each with heavy 7/16" thick plate glass back. A reserve roll of 150 feet of emery paper is contained in drums for quick renewal of grinding surface. Base has gutter drains for surplus liquid in wet grinding operations. Shipping weight, 95 lbs.

Standard Polisher No. 1500. A complete unit with direct mounted ¼ hp. radial thrust ball bearing motor. The 8" polishing disc is attached to a tapered arbor on the motor shaft by means of a stout sleeve. This sturdy construction and unusually smooth vibrationless operation helps to prevent pitting and amorphous film in polishing. The removable splash ring forms a convenient hand rest that aids the operator in precision work. A handy control lever on the mounted switch gives selective speeds of 575 and 1150 r.p.m. Shipping weight, 100 lbs.

Low Speed Polisher No. 1505-2, is particularly adapted to final stage polishing and for non-ferrous metal samples. The 8" disc is attached to a countershaft by a tapered sleeve with a long span between bearings, a construction feature that assures smooth operation. The selective speeds of 150 and 250 r.p.m. make this polisher perfectly adapted to the wax lap or lead lap polishing technique. Shipping weight, 105 lbs.

Either the standard or low speed polishers can be furnished in a single unit table model polisher No. 1516. A three unit table model No. 1540 is also available for maximum convenience in three stage polishing.

In the complete line of Buehler accessories and supplies for the metallurgical laboratory are found: Abrasive paper sheets, discs, and rolls in every grade • polishing solutions • polishing cloths • cut-off wheels and molding powders. Buehler service includes everything needed for preparing precision specimens from metallurgical samples, available from one reliable source.

Buehler Ltd.
A PARTNERSHIP

METALLURGICAL APPARATUS
165 West Wacker Drive, Chicago 1, Illinois

(*Continued from page* 168)

tern design for jobbing foundry use. The speaker recommended the adoption of split patterns whenever possible, in the interest of larger production and lower cost, and by means of slides illustrated examples of split and solid patterns. He also cited instances of advantageous use of sectional patterns for large work.

Other phases of pattern design discussed included core prints, fillets, and applications of sweep patterns, half patterns and skeleton patterns. In later discussion on pattern shrink allowances it was pointed out that castings of complicated shape do not shrink the same amount in all directions, and that in the case of cored cylindrical castings the principal shrinkage to be taken into account is along the length of the work, the core preventing shrinkage of the diameter. This prevents application of hard and fast rules in selecting pattern dimensions and emphasizes the need for experience in preparing all but the simplest designs.—*William G. Gude, publicity chairman.*

Metropolitan

DESPITE V-E Day headlines, more than 65 turned out for the annual meeting of the Metropolitan Chapter of the American Foundrymen's Association at the Essex House, Newark, N. J., May 7—a meeting which also featured the presentation of the British exchange paper on "Development and Application of Pattern Equipment for the Production of a Light Alloy Casting," by F. H. Hoult, Kent Alloys Ltd. of London, England.

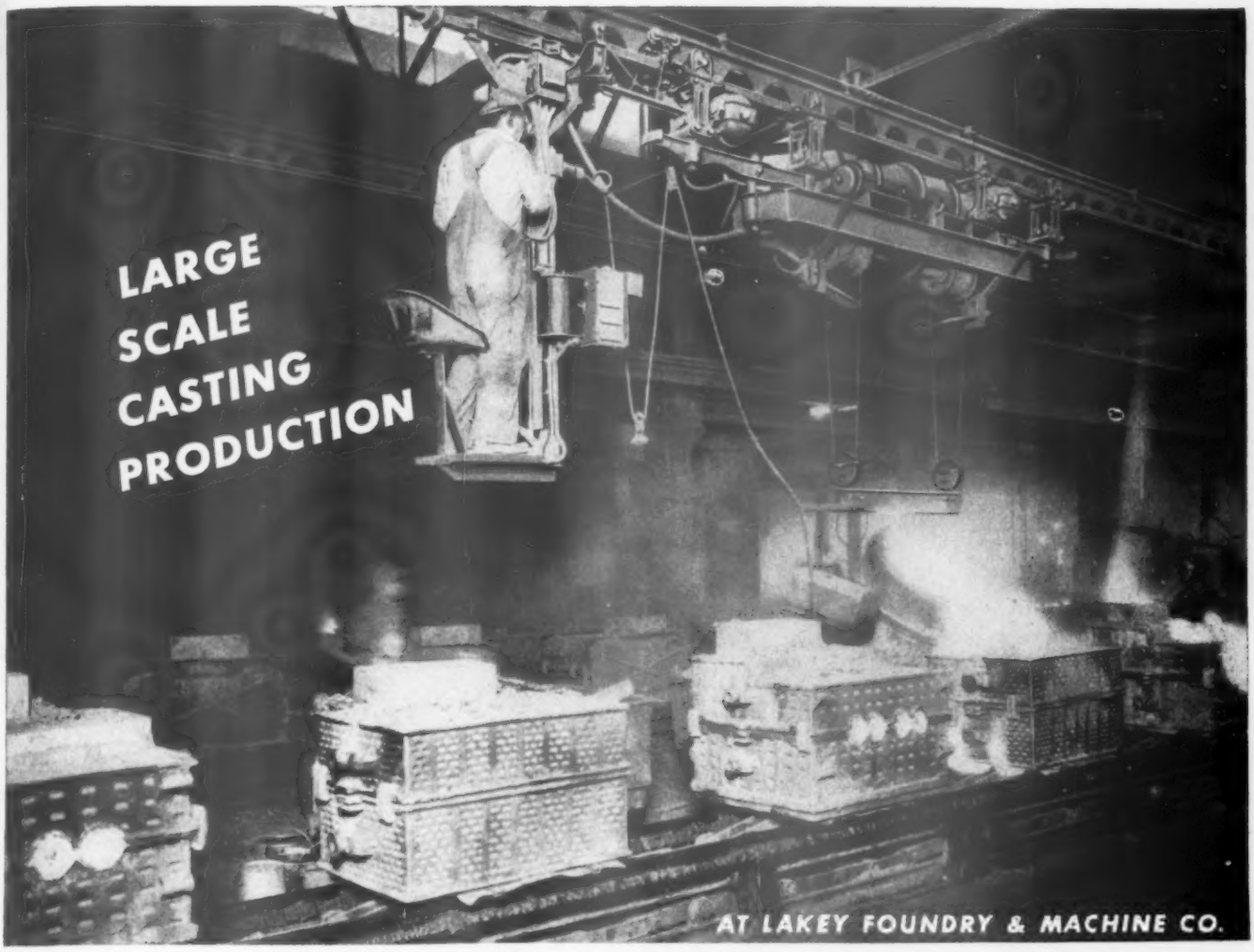
Horace A. Deane, American Brake Shoe Co., New York, formerly vice-chairman, was elected chairman for the ensuing year, succeeding T. D. Parker, Climax Molybdenum Co., New York. Harold Ulrick, Sacks-Barlow Foundries Inc., Newark, N. J., was named vice chairman; George Hadzima, Robins Conveyors Inc., Passaic, N. J., secretary; and Harold B. Caldwell, Whiting Corp., New York, treasurer.

Alec McIntosh, Wright Aeronautical Corp., Paterson, N. J.; J. S. Vanick, International Nickel Co., New York; Clifford J. Law, Worthington Pump & Machinery Corp., Harrison, N. J.; A. B. McCullough, American Steel Castings Co., Newark; and William E. Paulson, Thomas Paulson & Son Inc., Brooklyn, were all elected to the board of directors for a two-year term. Don Yeomans, local representative of George F. Pettinos Inc., Philadelphia, was named director for one year, filling the unexpired term of Mr. Hadzima, newly-elected secretary.

A substantial gain in membership of the Metropolitan Chapter was reported for the past year, with members now totaling 377 compared with 298 as of June 1 last year. Company memberships in the chapter increased from 49 to 69.

Average attendance at the regular dinner meetings increased from 66 to

(*Continued on page* 172)



Cleveland Tramrail is a very important factor in the production of casting at The Lakey Foundry & Machine Co., Muskegon, Michigan.

It makes possible a very high output of castings varying in weight from one-half pound to 1000 pounds.

Five 2-ton Cleveland Tramrail motor-driven platform-controlled carriers with hand-tilting ladles have the capacity to deliver 450 tons of molten iron per working day, direct from the cupolas to several continuous production lines where molds are traveling along on a drag-chain conveyor. They also supply hot iron to a line of 9 or 10 small floors which are serviced with smaller ladles.

Cleveland Tramrail equipment is used throughout many other departments such as core sand handling, core handling, pouring small castings, stoney shakeout, loading tumbling barrels and many miscellaneous small jobs where mechanical handling is found desirable.

Cleveland Tramrail permits taking the load directly to destination by the shortest route without hindrance from floor obstructions. No rehandling of hot metal is necessary. Hot iron reaches the molds with a minimum loss of heat.

The men are kept at a safe distance from the heat.

GET THIS BOOK!
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1155 EAST 283RD ST. WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Best Production Ever Recorded!

That was the unqualified verdict on Cortland Grinding Wheels, after another decisive War Production Test . . . Snagging operations in a large steel foundry in Pennsylvania were going from bad to worse — until Cortland Wheels were tested competitively against the brand then in use, with the following conclusive results:

WORK: Snagging gates and risers from castings.
Material: Hard, dense steel alloy rolls.
Machine: Fox Grinder, Swing Frame.
Wheel Speed: 8500 SFPM.

RESULTS: Competitive wheels removed gates from an average of 250 rolls. Previous high record had been 350. A Cortland Wheel, Type 1, of exactly the same size, removed 580 gates — "best production ever recorded," our sales engineer was proud to report. As a result, Cortland Wheels were made standard in the foundry.

In the extremely wide range of Cortland's abrasives, bonds, grains and wheel-types there's a combination that will solve every snagging and grinding problem *the one best way* . . . that will do *your* work faster, better and with greatly increased production per wheel.

Our engineers "know the combinations." Call on us any time — without obligation — for a practical, worth-while demonstration of new ways to efficiency and economy.

18

For Better Snagging

Write to CORTLAND GRINDING WHEELS CORP., 6 Cortland Street, Chester, Massachusetts

CORTLAND

(*Continued from page* 170)

110 for the season just ended; and this average, it was pointed out, represented dinner attendance only. The average, including those who came in later for just the technical sessions, was probably 20 to 25 persons more, it was believed.

One feature of the May 7 program was the presentation of the new film, "Carbon Black Treasure," by the National Carbon Co., New York. The story of carbon as it is found and developed into fabricated products, including electrodes and anodes, and their uses was revealed.

The British exchange paper was illustrated by 26 lantern slides and was presented, in the absence of the author, by Clarence Cline, Malcomb Foundry Co. Inc., Newark.

Predicating his discussion on the theory that a casting is only as good as the pattern from which it is produced, Mr. Hoult, the author, went into detail on the pattern equipment and molding procedure used in producing light alloy castings. The pattern equipment discussed was said to have proved satisfactory in the production of many thousands of castings.

Dr. N. E. Woldman, chief metallurgical engineer, Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J., presided as technical chairman.—*Ben K. Price.*

Saginaw Valley

A RECORD group of Saginaw Valley foundrymen gathered at Frankenmuth, Mich. May 3 to hear James H. Smith, general manager of Saginaw Malleable Iron Division, General Motors Corp. speak on the subject of "Progress with Better Methods and Motion Study."

Mr. Smith, in introducing his subject, used the common fountain pen to illustrate what motion study is and what it accomplishes. He pointed out that when a person used the pocket fountain pen many, many times a day, that the time and effort involved in withdrawing the pen from the pocket, preparing it for use and then reversing the process to put it away, became so great that the desk fountain pen was developed. The latter, symbolic of results with motion time analysis, requires a minimum of effort and time to grasp and return.

Foundry jobs involving repetitive motions on the part of the workman, such as production coremaking or molding, can be made much less fatiguing and far more productive if materials and equipment are arranged to allow the least fatiguing motions to be used, he stated. To illustrate clearly how the principles of motion study were applied in his organization, he showed slides of old and new arrangements at molding machines, hydraulic presses, shears, grinders, etc., in the shop.

Stuart Martin, production manager of Saginaw Malleable, assisted the speaker in an actual demonstration of coremaking. They first showed how the cores might

(*Continued on page* 177)

WEIGH ALL THE FACTS...AND YOU'LL FIND IT PAYS TO USE PENOLYN CORE OIL...

If you'd like help on a tough problem—just drop us a line. Our engineers are always at your service.

1. **UNIFORMITY**—rigid laboratory control; no "settling out" in drums or storage tanks.

2. **CONCENTRATED FORM**—high sand to oil ratio; economical.

3. **NO OBNOXIOUS ODOR**—during mixing, baking or pouring.

4. **NO SEEPAGE**—will not settle or drain to the bottom of sand mix or green, unbaked cores; baked cores will not stick to plate.

5. **NO CRUSTING OF GREEN MIX**—air dries slowly; green mix can be stored as long as 24 hours and still be usable.

6. **CLEAN WORKING**—eliminates frequent cleaning of core boxes; sharp draws.

7. **WIDE TEMPERATURE BAKING RANGE**—small and large cores can be baked at the same time; no burnt cores.

8. **POLYMERIZED FORMULATION**—maximum strength right through to center of baked core; dryer and plate side of equal hardness as exposed surfaces; no adherence.

9. **MINIMUM GAS**—less venting; fewer blows; lower casting losses.

10. **AMPLE COLLAPSIBILITY**—no hardened lumps to dig out; disintegrates while allowing metal to solidify and cool; fewer cracked castings.

Sandslingers—

Within a month after purchasing two Stationary Sandslingers, Howard Foundry, Chicago, broke a serious magnesium casting bottleneck and increased critical mold production on B-29 Bomber nosepieces from approximately 4 per shift to 30 per shift . . . AN INCREASE OF ALMOST *8* TIMES! Previously hand-ramming of these molds took from 1½ to 2 hours apiece —now the "Slingers" ram it in only 6½ minutes with consistent uniformity.

Arrows (1 and 2) point out the Stationary "Slingers" that "broke the bottleneck" and helped put more B-29's over Tokyo.

Head-on view of the gigantic B-29. The ordinarily difficult-to-cast nosepiece was simplified when the "Slingers" went into action ramming the sand molds with amazing speed. This modern ramming method enables Howard to produce a high quality casting that meets the rigid Army specifications.

THE BEARDSLEY & PIPER COMPANY

B&P

"BETTER METHODS"

BREAK BOTTLENECK . . . INCREASE CASTING PRODUCTION 8 TIMES!

HERE'S HOW THE SANDSLINGER RAMS (See 1 & 2 on opposite page)

The Sandslinger is so well-balanced and easy to operate that one man can maneuver and ram a most difficult pattern design. As sand is delivered to the head of the "Slinger," a sand wad is formed and projected into the mold at a predetermined velocity so that density can be controlled for varying kinds of work. The ramming unit varies with size, type and application of the machine with capacity from 1000 to 2000 pounds of rammed sand per minute.

SANDSLINGERS SAVE TIME, LABOR, MATERIALS AND IMPROVE CASTING QUALITY

Sandslingers ram with great speed and uniformity—assure considerable increases in production, savings in casting weights, lowered scrap loses, and greatly increased profits.

Your men will *like* to work with the Sandslinger—it eliminates hard, laborious hand-ramming. Even the most inexperienced worker can learn to operate it accurately in an extremely short time.

For a complete and comprehensive study on the subject of ramming, ask for our monthly magazine "Better Methods" which contains the article, "What IS The Best Ramming Method?" All the text material was prepared by an entirely impartial source—a thorough comparison is made of all ramming methods. It's free—no obligation incurred—write for it today!

THERE'S A SIZE AND TYPE OF "SLINGER" TO MEET YOUR INDIVIDUAL FOUNDRY NEEDS!

The size of a foundry and its particular requirements determine the best type of Sandslinger to use. There's a "Slinger" that will do your ramming—in less time and at lower cost!

Shown to the right is the Speedslinger, the fastest ramming, most efficient unit in the "Slinger" family. The operator rides the ramming head and directs every function of the machine through centralized finger-tip control. Working up and down the foundry on a track, it requires no elaborate or expensive sand handling system and carries its own sand to the job.

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Leading *producers* of electric furnace steels have been consistent users of INTERNATIONAL Graphite Electrodes for 15 years. So have principal electric furnace *manufacturers.* Neither could afford to rely on them for quality steel production if they were not confident that INTERNATIONAL electrodes fully measure up to every important standard by which acceptable electrodes are judged.

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International Graphite & Electrode Corp.

SAINT MARYS, PA.

7373

(*Continued from page* 172)

be made prior to making a motion time analysis of the job. They then showed how the same cores might be made after applying motion time analysis to the job and making alterations in equipment and location of materials. During the coremaking, each motion was discussed to bring out the reason for the changes. The time necessary to make an equal number of cores in each case was checked to show the vast improvement resulting from the motion study.

A motion picture was shown of the operation of a new mold handling device which was developed at the speaker's plant. With this device, heavy copes or drags can be properly placed on the conveyor by power with a minimum of human effort.

The Saginaw Valley chapter was host at this meeting to a number of foundrymen from outside the valley, including groups from Cadillac, Detroit, Muskegon, and Albion. In the Muskegon group was Joseph Brooks, chairman of the Western Michigan Chapter.

This being the final meeting of the season, the annual business session was held to elect officers for the coming season. Those elected were: Chairman, H. G. McMurry, Buick Motor Division, Flint, Mich.; vice chairman, John Smith, Chevrolet Grey Iron Foundry, Saginaw, Mich.; secretary-treasurer, M. V. Chamberlin, Dow Chemical Co., Midland, Mich.; director for 2 years, O. E. Sundstedt, General Foundries, Flint, Mich.; directors for 3 years, E. H. Bankard, Buick Motor Division, Flint, Mich.; J. E. Bowen, Chevrolet Grey Iron Foundry, Saginaw, Mich., and K. H. Priestley, Eaton Mfg. Co., Vassar, Mich.—*Joseph J. Clark, reporter.*

Canton

APRIL 20 was National Officers' Night as well as the final meeting of the 1944-45 season for the Canton District Chapter of the A.F.A. The meeting was held at the Elks Club, Canton, where a delicious pickerel dinner was served by the famous Chef With. 65 guests and members were present to welcome Robert E. Kennedy, secretary of the A.F.A., William B. Wallis and Frank Dost, directors, and Pat Dwyer, engineering editor of THE FOUNDRY.

Secretary Kennedy spoke about the history of the organization and its important work which has proved to be so valuable to the entire industry. Mr. Wallis elaborated on Bob Kennedy's remarks and briefly mentioned the dues change which affects company and sustaining memberships only. Frank Dost congratulated the chapter and said he was pleased at the many new faces present which, he said, proves the wisdom of granting of a charter in the Canton District. Mr. Dost also spoke on the place the foundry will take in the postwar era.

Pat Dwyer told several of the choice tales for which he is most famous and it must be said that his unexpected presence was highly appreciated.

Officers and directors for the coming

8 Screenarators

"DO WONDERFUL JOB"

FOR CHICAGO HARDWARE FOUNDRY CO.

● John H. Fienning, Superintendent of the Chicago Hardware Foundry Co., North Chicago, Ill. says: "Our eight Screenarators are doing a *wonderful job* in preparing our sands and are labor saving at a very moderate up-keep."

● Dozens of job shops and production foundries all over the country tell us the same story . . . how thoroughly the Screenarator cleans, cuts, screens, double-aerates and blends sand . . . how this versatile, low cost sand conditioner produces more flowable, more rammable sand that assures smoother finished castings . . . how it saves both time and labor. See for yourself how the Screenarator conditions sand the *way* you want it, *where* you want it! Write for complete information today.

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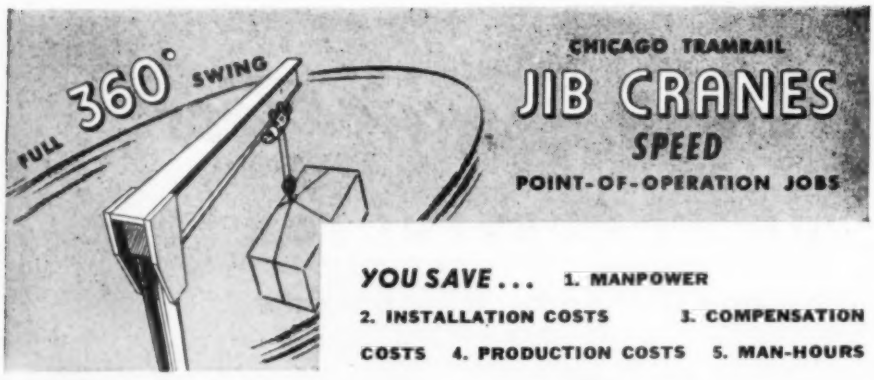
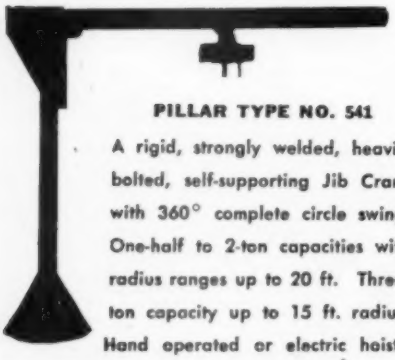


Photo courtesy of Union Pacific Railroad

The assembly of railroad wheel-and-axle units is a job that calls for precise coordination in heavy handling. Too light a job for costly overhead cranes, and too dangerous for all but the most skilled manual labor, it is an ideal application for fast-action, flexible Jib Cranes. Working in conjunction, the two nimble Jib Cranes ease the wheels into place on the axle swiftly and surely, without danger to the delicate bearing surfaces of the axle or journal. This used to be a job for skilled workmen, but now easy-to-operate Jib Cranes take over the difficult task—a real help in these labor-scarce times.

Jib Cranes help to reduce compensation costs because they lessen the probability of accidents that are so frequent in heavy handling. For example; the operation above was formerly a dangerous one. Many strains and broken bones resulted from rolling the heavy wheels into position, but now the men have only to guide the free-swinging Jib Cranes as they swing around, pick up the wheel and carry it to the point of assembly.



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year include: Chairman, H. G. Robertson, American Steel Foundries; vice chairman, I. M. Emery, Massillon Steel Casting Co., central area, and C. F. Bunting, Pitcairn Co., Barberton, west area; secretary, C. E. Shaw, American Steel Foundries, Alliance; treasurer, Otis D. Clay, Tuscora Foundry Sand Co., Canal Fulton.

Directors: West area, Charles W. McLaughlin, Barberton Foundry Co.; Charles Reyman Jr., Atlantic Foundry Co., Akron; Charles Scoville, Babcock & Wilcox Co., Barberton. Central area, Earl Brown, Union Metal Mfg. Co., Canton; H. E. McKimmey, Carnegie-Illinois Steel Corp., Canton; Chet Williams, Massillon Steel Casting Co. East area, F. K. Donaldson, Machined Steel Castings Co., Alliance; Fred C. Glass, the Deming Co., Salem; Lewis Way, Columbiana Foundry Co., Columbiana. —*George M. Biggert, secretary.*

Pittsburgh

PRODUCING high quality Navy brass and bronze castings in a small foundry without benefit of a high degree of mechanization and without the aid of extensive testing equipment or sand conditioning equipment, was outlined by O. Edwin Decker, foundry superintendent, Acheson Mfg. Co., Rankin, Pa., at the April meeting of the Pittsburgh Foundrymen's Association. Mr. Decker's shop turns out approximately 20,000 pounds per day, mostly in flanges and fittings, all of which go to the Navy. About 95 per cent of the cores are machine made, the remainder being large hand-made cores.

The most interesting feature of the molding operation is that for the past 15 years girls have been used to make all hand-made cores, and for the past 3 to 4 years girls have operated molding machines. The shop has no sand control system and little test equipment. Metal produced is largely 85-5-5-5, M and G. No risers are used on castings produced from 85-5-5-5 metal, while risers are generally used for the other analyses. Pouring temperature runs from 2050 to 2200 degrees Fahr., depending on the analysis of the metal. Castings are cleaned in an airless type blast unit directly from the mold, including the risers if there are any.

A considerable portion of the meeting was devoted to discussion of Navy test bars and the effect of risers on the physical properties of the bars. Mr. Decker outlined the considerable amount of research he had done on the use of a standard Navy test bar with risers over the threaded end sections only. Much better physical properties were obtained on bars cast in this manner than by the standard method using a solid riser over the entire length of the bar. There is some evidence to show that this is due to the heavy chilling effect of the large riser on the small central section of the bar. Heavy tension caused by shrinkage in the riser may have some

(*Continued on Page* 180)

Cordip, an exclusive product of the United States Graphite Company, is simplifying dipping and improving cores and castings in many busy foundries. In powdered form and containing its own binder, Cordip is easily mixed with water to 35°Baume' for dipping and to 25°Baume' for spraying.

Cordip is equally efficient for dry or green sand cores. It distributes itself evenly, does not build up on shoulders or seal vents or leave ruffled uneven surfaces. Fast drying Cordip does not rub off when handled and holds true core dimensions.

By eliminating penetration, Cordip insures castings freer of sand and thus reduces cleaning time.

It will pay you to use Cordip to improve the quality of your castings and increase production in your foundry. There is a grade of Cordip to exactly meet your requirements. For further data write to:

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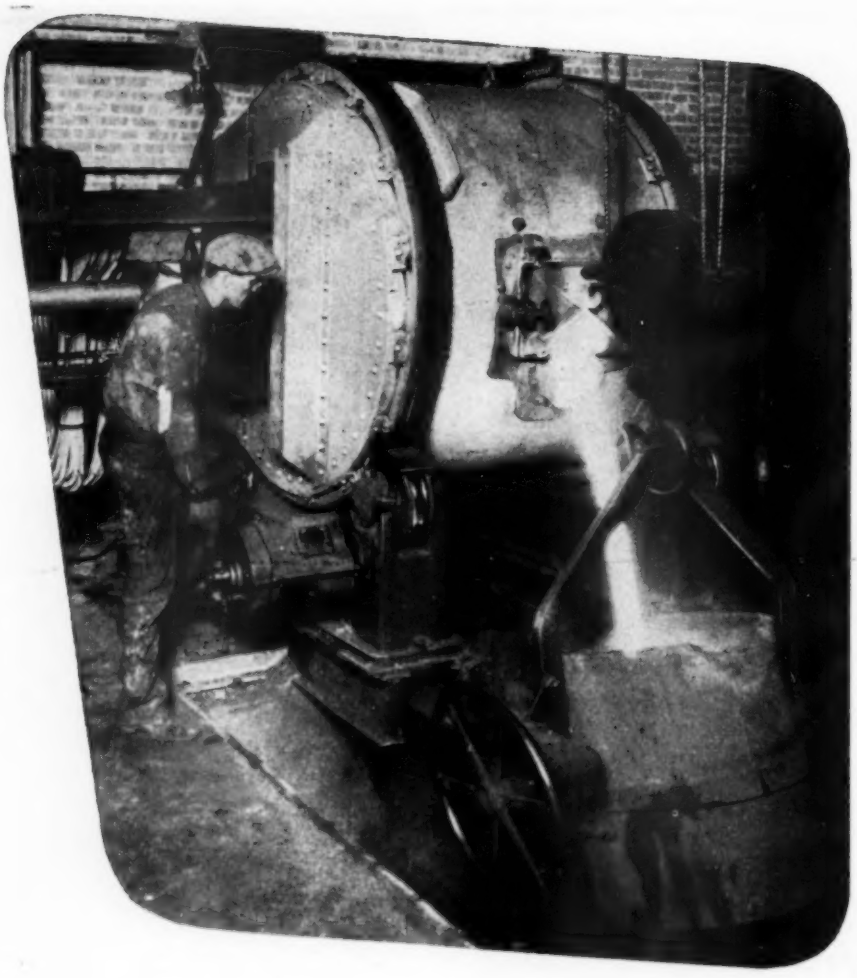

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Detroit Rocking Electric Furnaces melt as many as eight ferrous or sixteen non-ferrous heats in one 8-hour day. They insure higher quality castings because their unique design permits automatic stirring action under non-oxidizing conditions and allows precise control over time, temperature, and other melting factors. They eliminate combustion products: since melting takes place in a closed chamber, dirt and fumes are reduced to a minimum. Versatile, flexible, fast, Detroit Rocking Electric Furnaces fit ideally in foundries where speed and quality production are of prime consideration. Available in sizes from 10 lbs. to 4 tons. Write for complete particulars.

DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

(*Continued from page* 178)

effect on the structure of the central section and cause a shift in physical properties. The chief difficulty with standard method test bars has been in the elongation test where results in some cases have dropped 2 to 3 per cent below standard specifications.

At the March meeting of the association a nominating committee composed of H. T. Herr Jr., J. S. McCormick Co.; W. Hays Satterfield, Pittsburgh Steel Foundry Corp.; and George H. Zoerb, Sharpsburg Foundry Co., was appointed. At the April meeting this committee reported the following slate subject to election at the May meeting and installation at the close of the fiscal year, June 30: President, N. J. Kelly, Kelly Foundry Co., Pittsburgh; vice president, M. J. Kellner, Walworth Co., Greensburg, Pa.; secretary-treasurer, R. L. Hartford, THE FOUNDRY, Pittsburgh; executive committee, T. A. Reynolds, foundry consultant, Pittsburgh; C. B. Dick, Westinghouse Electric Corp., East Pittsburgh, Pa.; A. M. Cadman, A. W. Cadman Mfg. Co., Pittsburgh; H. P. Spilker, Sterrit Thomas Foundry Co, Pittsburgh; and Harry H. Kennedy, Continental Foundry & Machine Co., Coraopolis, Pa.—*Robert L. Hartford.*

Southern California

IF ANY two foundrymen agree on technical procedures in core blowing the fact did not become apparent during a spirited discussion following a talk on this subject at the regular meeting of the Southern California Chapter of the A.F.A., held in the Clark Hotel, Los Angeles, April 20.

Speaker on the principal topic of the evening was Lawrence D. Pridmore, International Molding Machine Co., Chicago. In an able lecture, supplemented with slides, Mr. Pridmore described the machine methods of blowing sand into molds to form cores.

Later questions from the floor centered upon the difficulties of apportioning vents, on the cleaning of boxes and on the relative size of vent holes in ratio to air pressures. It was Mr. Pridmore's contention that line pressures are the accepted norm in usage, that kerosine cleaning coupled with blowing out with the air hose is the best general method, and that the number of vent holes and their spacing is "an art in itself" for which there can be no set rule.

In addition to core blowing, members at the meeting heard an explanation of contract termination procedures contained in material prepared by the Arthur R. Gray Co., accountants.

Chapter President W. D. Bailey Jr. announced the opening of a tuition-free course in foundry practice May 1 by the University of California at the Huntington Park High School. J. A. Burgard, Columbia Steel Co., will instruct the group each Tuesday from 7 to 10 p.m. for 16 weeks. Special emphasis will center on steel foundry methods.

(*Continued on page* 184)

ANNOUNCING!

The X-RAY PLAN

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QUALITY CONTROL OF FOUNDRY PRODUCTION

A New Service for Foundries

The X-Ray Plan for Quality Control undertakes to improve and check foundry practice by providing, as it does, a quick, complete "look inside" the walls of a casting, giving a record of the flow of metal, the changes brought about in cooling and an over-all picture of the finished casting. We offer you, in addition, such chemical and physical analyses as are desired, including sand control and analysis. « « « We invite you, Mr. Foundryman, to add the resources of X-Ray inspection and control to your production facilities —our business is strictly a *service* through which you can extend your organization to include a complete X-Ray and metallurgical diagnosis department of skilled personnel—all at a fraction of the cost of establishing your own X-Ray department.

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When The Iron is Too Soft

use CMSZ Alloys in the Ladle

With CMSZ Alloys, you get the advantages of a chromium addition without sacrificing machinability, because CMSZ Alloys contain graphitizing elements as well as chromium.

The iron will be harder...stronger...have better resistance to wear and heat...and with most irons there will be no increase in chill.

For further information on how to use CMSZ Alloys, send the coupon for the booklet "CMSZ Alloys for Ladle Additions of Chromium to Cast Iron."

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With *SMZ* Alloy, you can get graphitizing action without sacrificing strength, for in most irons *SMZ* Alloy additions *increase* the tensile strength, transverse strength, and deflection, while chill depth *decreases*.

The iron will still be strong but will have less chilling at edges, corners, and thin sections, and it can be machined.

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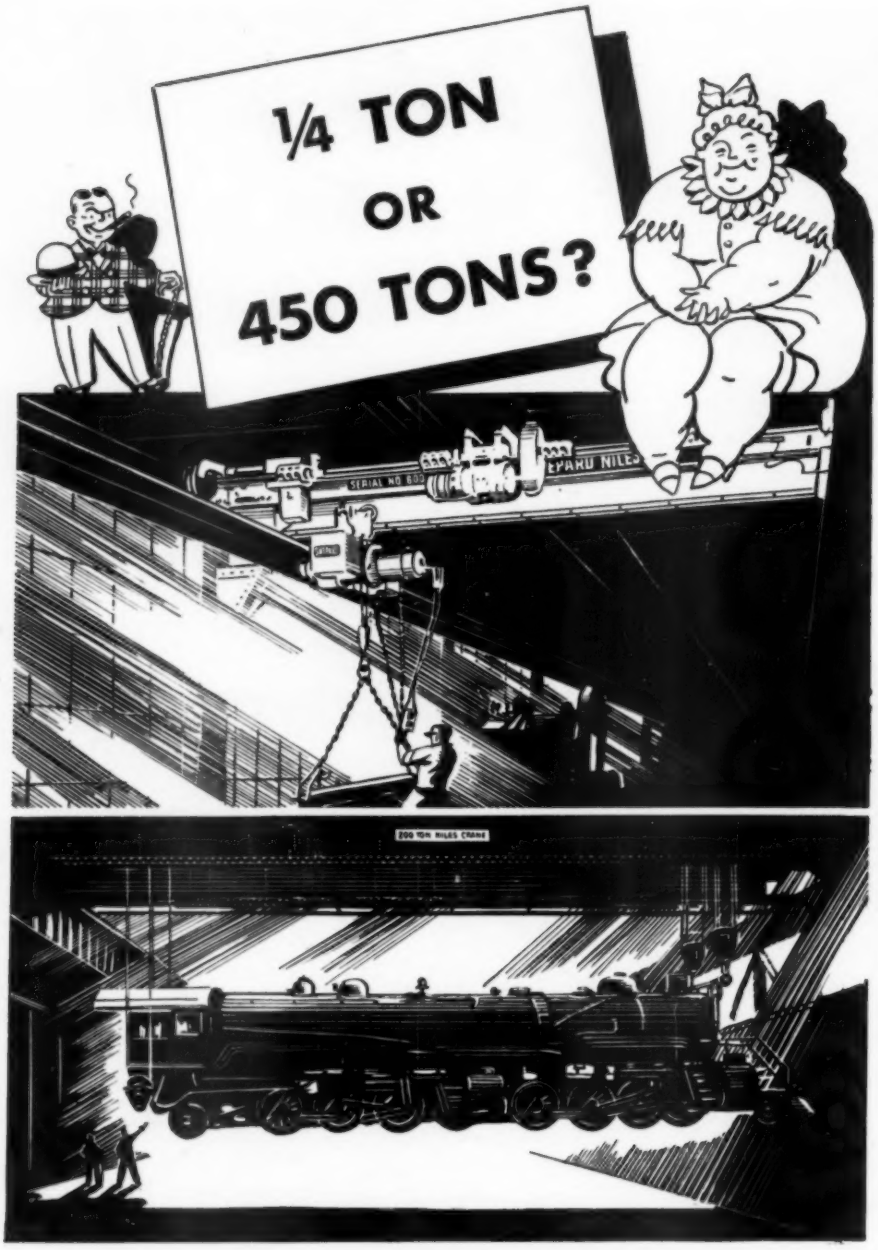

Whatever the load or the need, there is a Shepard Niles Crane precisely suited to every task. The cranes are of all types: overhead traveling, grab bucket, transfer, inner-running trolley, single I-beam, ice-plant, gantry, jib and bracket.

Shepard Niles Cranes feature the "Balanced Drive" (planetary gear) Trolley, dust, fume and moisture-proof housings, automatic oil-bath lubrication, permanent alignment and extremely accurate control of every motion.

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Ask the Shepard Niles representative in your locality how best to solve your material handling problem. Or, write directly to Shepard Niles.

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(*Continued from page* 180)

New members welcomed by the chapter, as announced by Mr. Bailey, included: Walter Vals, Aluminum Casting Co.; Roy Thomas, Mueller Co.; J. B. Marchand, Maco Mfg. Co.; Alex J. Babbo, Axelson Mfg. Co.; Edward D. Page and James B. Reeves, Rich Mfg. Co.; H. A. Graham and Joseph B. Tipton, Los Angeles Steel Casting Co.; and Dwight C. Cooley, Paul G. Wagner Co.—*Maurice Beam.*

Reading

HOW the Navy Department, through its research laboratory at Anacostia, has improved techniques in making steel, nonferrous and gray iron castings, was explained at the April 16 meeting of the Reading Foundrymen's Association in the Berkshire Hotel, by Howard F. Taylor, head of the steel castings section of the Naval Research Laboratory. Emphasizing the need for the closest co-operation among designing engineers, patternmakers and foundrymen for production of "perfect" castings, the speaker also stressed how essential control of atmospheric pressure is in producing castings which now meet service specifications.

Mr. Taylor, addressing approximately 100 foundrymen, said that with the exception of gray irons, the reactions of alloy metals are very similar to steel, tests at the laboratory showed. He warned that more attention by foundrymen must be paid to controlled directional solidification in all types of foundries, and predicted that those who do not heed the warning will "in the not too distant future be out of business."

Slides showing a technique developed at the Norfolk Navy Yard for the casting of turbine parts, were explained. Also shown were slides depicting the casting of tall cones for torpedoes. Werner Finster, Pratt & Cady Division, American Chain & Cable Co., acted as technical chairman. —*W. I. Cassidy, secretary.*

Central Ohio

MARCH 26 meeting of the Central Ohio Chapter of the A.F.A. was held at the Ft. Hayes Hotel, Columbus. In the absence of Chairman Kenneth McGrath and Co-chairman Tom Barlow, Norman Dunbeck presided.

C. E. Sims, Battelle Memorial Institute, addressed the steel group and outlined the principles involved in electric steel manufacture and emphasized the difficulties encountered which resulted from improper deoxidation and from gases other than oxygen. The stringer type inclusion was described and the mechanism of pin hole formation presented.

Dr. E. P. Halliwall, the H. Kramer Co., addressed the nonferrous group and presented a paper on manganese and aluminum bronzes. He discussed the physical chemistry of these alloys and tied in physical chemistry with shop control of producing them. About 12 men

(*Continued on page* 186)

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Revive the enthusiasm of your operators. They'll like the higher cutting speed, the uniform and dependable quality, the reduction of dressing. Less vibration and cooler-cutting are added advantages.

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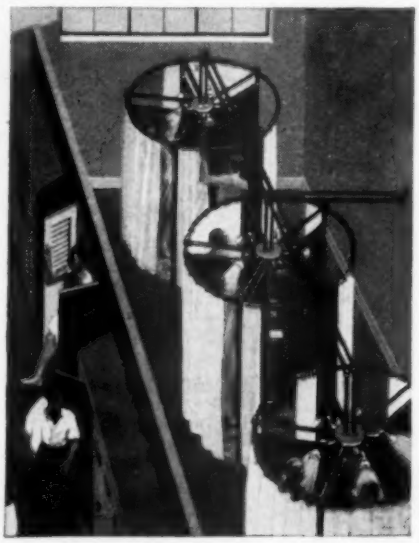
What's a Work-Mole?

"Why that is the name I gave John when he used to come home from work still covered with grime and dirt from his job. But I can't call him that any more because NOW he comes home clean, refreshed and respectable looking, just like Mrs. Jones' husband."

Yes, more and more progressive managements are taking steps to make the *Work-Mole* an extinct species for they know that it is much easier to keep a worker satisfied and "on the ball" when he can clean himself up at the end of the shift, and leave the plant refreshed instead of tired and dirty.



A practical arrangement of the 5-stall showers at end of locker-room. Constant-temperature feature minimizes scalding hazard

But there are other sound reasons too, for installing Bradley Multi-Stall Showers. For they offer the same advantages of savings on maintenance, installation costs, and water consumption as do Bradley Washfountains. One 5-Stall shower unit needs only three piping connections, one for hot water, one for cold and one for the drain, as compared to the 15 piping connections required for 5 ordinary showers.

Bradley's Multi-Stall Showers are made in 3- and 5-stall models partially assembled for quick economical installation in either new or existing buildings. See pages 12 and 13 of latest Catalog 4308 for complete details and floor plans. If copy of Catalog and Washroom Survey Sheet are not at hand, write BRADLEY WASHFOUNTAIN CO., 2217 W. Michigan Street, Milwaukee 1, Wisconsin.

BRADLEY multi-stall showers

Latest illustrated Catalog 4308 and Washroom Survey Sheet sent upon request. Write today.

(*Continued from page* 184)

enjoyed this session and took advantage of Dr. Halliwall's vast store of knowledge by plying him with questions.

At the April 23 meeting of the chapter, held at Fort Hayes Hotel, Columbus, Jack Schram, Swan Finch Oil Co., Columbus, presented a paper on "Core Room Problems," and C. R. Wiggins, Ferrous Metals Corp., New York, discussed "F Metal."

Mr. Schram gave a detailed analysis of the causes and cures of certain typical core room troubles. In speaking of sticking in the corebox, he emphasized the effect of weather conditions, time of mixing and viscosity of core oils. In discussing soft core surfaces he mentioned the effect of coarse sands and burning of cores. He recommended the use of migratory binders. In similar manner he discussed in detail the effect of the rate of baking on all core properties, the causes of penetration of cored surfaces and the causes and cures of shrinks and cracks.

Mr. Wiggins gave a black board talk on F metal, a pearlitic malleable iron, the characteristics of which he described, together with its postwar possibilities. The speaker's remarks were well received and discussion from the floor added to the value of the evening.—*Frank Kiper, secretary.*

Eastern Canada and Newfoundland

A COMPLETE and up-to-date talk on "Prospects and Problems for Light Alloy Castings" was presented by G.M. Young at the March meeting of the Eastern Canada and Newfoundland Chapter. Mr. Young is Chief Metallurgist of the Aluminum Co. of Canada Ltd., Kingston, Ont.

Mr. Young pointed out that this is the "light metal age," with considerable emphasis being laid on increased speeds and efficiencies through reduced weights of machinery and equipment. He described the outstanding physical properties of aluminum and magnesium alloys to show how they fitted into present-day trends.

The analyses and properties of the most popular aluminum and magnesium alloys were discussed, and their applications correlated with their properties.

Mr. Young dealt briefly with some of the inherent difficulties in the production of light metal castings, such as porosity and microshrinkage. He outlined some of the methods which have been developed for the elimination of these difficulties.

In discussing postwar applications he stated that a great many of the wartime uses will have similar peacetime applications. One of the biggest fields will be transportation. Not only will the light metals be used in aircraft but in trains, trucks, automobiles and boats where reduced weight means increased speed or increased pay load.

The food, chemical and electrical in-

(*Concluded on page* 188)

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1. Air tools are much smaller than comparable tools otherwise powered. This means:
   - a. Less weight
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2. Air tools cannot be harmed by overloading. This means:
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   - a. No danger of fire, explosion or injury to worker
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   - a. Maximum power reached more quickly
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ELEMATIC THERMOCOUPLE

(*Concluded from page* 186)

dustries are all expanding their uses of light metals. Possibly one of the most interesting developments will be in the building industry.

It is certainly reasonable to expect that in the years to come light metals will contribute materially to the development of our civilization.—*G. Ewing Tait, publicity chairman.*

Michiana

REGULAR monthly meeting of the Michiana Chapter of the A.F.A. was held April 3 at the Hotel La Salle, South Bend, Ind., and featured a talk by John N. Kane, American Air Filter Co., Louisville, Ky. His subject was "Control of Dust in Foundries."

Results of the election of officers and directors was announced, the new officials being as follows: Chairman, W. V. Johnson, Oliver Farm Equipment Co., South Bend, Ind.; vice chairman, John McAntee, Covel Mfg. Co., Benton Harbor, Ind.; secretary-treasurer, V. S. Spears, American Foundry Equipment Co., Mishawaka, Ind. Directors for 3-year terms: John McDonald, Round Oak Furnace Co., Dowagiac, Mich.; G. O. McCray, Bendix Products Div., Bendix Aviation Corp., South Bend; J. E. Digan, Radiator Equipment Co., Logansport, Ind.; M. F. Surls, Park Equipment Co. H. E. Ardahl, Michiana Products Co., will fill the unfinished term of John McAntee, newly elected vice chairman.

The Ladies' Night party held at Hotel Elkhart on April 7 was attended by 90 couples. The party, which was in charge of W. V. Johnson, chairman of the entertainment committee, assisted by Leonard F. Tucker, V. C. Bruce, Howard B. Voorhees, K. A. Nelson and V. S. Spears, was a great success.

The April meetings conclude activities of the Michiana Chapter until next fall. The chapter has experienced a great year of progress under the able leadership of Chairman V. C. Bruce and he is turning over to W. V. Johnson, his successor, an active and enthusiastic organization.—*C. W. Petersen.*

St. Louis

MAY 10 meeting of the St. Louis District Chapter of the A.F.A. was held at the De Soto Hotel with 78 members and guests in attendance. Hyman Bornstein, in charge of the testing and research laboratories of Deere & Co., Moline, Ill., and a former president of the A.F.A., was speaker of the evening.

In his talk on "Malleable and Pearlitic Malleable Castings" Mr. Bornstein outlined the methods by which malleable can be made, the importance of moisture and carbon control, heat treating, and the length of time it formerly took to heat treat castings as compared with present practice. He also brought out the fact that in duplexing, the air furnace should be about two and one-half times the capacity of the cupola. The talk was followed with considerable discussion. — *Charles E. Rothweiler, secretary-treasurer.*

Individually Tested for Adhesion to Spindle

Bay State mounted wheels and points can't be made unless the bond between the abrasive and mandrel is absolutely secure. For these mounted wheels and points are turned down from large blanks and sized and shaped *on their own mandrels.* Thus a positive test for the bond is automatically provided.

Bay State's method of making mounted wheels and points also offers you other exceptional advantages:

1. **No breaking-in period is necessary** — because they are dressed as they are shaped.
2. **They run absolutely true** — because each is concentric to its mandrel.
3. **They are free from hard and soft spots** — because they are manufactured in blanks.
4. **They can be used right down to the mandrel** — abrasive and mandrel are "wedded for life".

Mounted wheels and points have important jobs to do — so proper importance should be given to their selection. If you specify Bay State, you can be sure they'll make the grade.

Similarly, into other items in the broad range of Bay State abrasive products, Bay State builds *extras* that assure consistent performance. Check them. Test them. Get complete facts, including the handy, pocket-size catalog on mounted wheels and points.

BAY STATE ABRASIVE PRODUCTS CO.
7 Union Street, Westboro, Mass.

BAY STATE

ABRASIVE PRODUCTS

Top Performance Consistently Duplicated

GRINDING WHEELS · HONING AND SUPERFINISHING STONES · PORTABLE SNAGGING WHEELS · MOUNTED WHEELS AND POINTS · CUT-OFF WHEELS · INSERTED-NUT DISCS · AND CYLINDERS

Here's a new slant on the Labor-Shortage Problem

Maybe it's not more MEN you need

Foundry help is hard to get, that's true. But did it ever occur to you that there may be another way to lick the problem. . . . not by getting more men but by taking better advantage of the help you have already?

Many foundries are doing it—and are increasing production as a result. The method is simple: reduce the amount of labor involved in performing necessary foundry operations.

In one place alone—the shakeout department—they have found that several new sources of labor-supply are opened when a Robins Floatex is introduced. Small youths, old men—even women—are being employed for shakeout work, thanks to the Robins Floatex.

Robins has developed methods and machinery that literally take over the labor-portion of shakeout work . . . doing the job quicker, better, easier and at less cost.

The heart of the system is the Robins Floatex Shakeout—the shakeout that shakes the flask, not the building. Around it is engineered a plan—tailored to your particular needs — that removes all the back-breaking labor of handling flasks and even eliminates several stages in the conditioning of sand.

An analysis of your shakeout problems will be made, without cost or obligation. Write, giving full particulars of your shop, its operations and your processes so our recommendations can be based on all the facts. Please address Dept. F-6.

Robins Floatex Shakeouts are made in Portable models for loaded flasks weighing up to 17 tons; in Standard models, up to 100 tons or more—non-discharging and self-discharging types; with and without flask loaders.

ROBINS *makes:* BELT CONVEYORS • COAL AND ORE BRIDGES • BUCKET ELEVATORS • CAR AND BARGE HAULS • CAR DUMPERS • CAR RETARDERS • CASTINGS • CHUTES • CONVEYOR IDLERS AND PULLEYS • CRUSHERS • FEEDERS • FOUNDRY SHAKEOUTS • GATES • GEARS • GRAB BUCKETS • PIVOTED BUCKET CONVEYORS • VIBRATING SCREENS • SCREEN CLOTH • SELF-UNLOADING BOAT MECHANISMS • SKIP HOISTS • STORAGE AND RECLAIMING MACHINES AND SYSTEMS • TAKEUPS • LOADING AND UNLOADING TOWERS • TRIPPERS • WEIGH LARRIES • WINCHES • WINDLASSES

FOR MATERIAL AID IN MATERIALS HANDLING . . . . . *It's ROBINS*

ENGINEERS • MANUFACTURERS • ERECTORS

ROBINS CONVEYORS INCORPORATED
Founded in 1896 as Robins Conveying Belt Co.
PASSAIC • NEW JERSEY

MATERIALS HANDLING MACHINERY

MAGNESIUM CASTINGS FOR AIRCRAFT

(*Continued from page* 89)

perature is raised to 1625 to 1675 degrees Fahr. Metal is held in that range for 8 minutes and at that point the flux is burned white and dry.

The crucible is removed from the furnace, and allowed to cool down to within 35 degrees of the desired pouring temperature, which will range from 1395 to 1500 degrees Fahr., depending upon the casting. The thermocouple is left in the metal until just before pouring, and when the temperature reaches 35 degrees above pouring the flux is skimmed and the crucible "edged" with a wire brush to insure a clean lip. The metal is dusted with a coating of a 50-50 mixture of boric acid and sulphur, and just before pouring the mold is flushed with sulphur dioxide gas.

During pouring the metal in the crucible is dusted with the boric acid-sulphur mixture, but none is put on the stream issuing from the crucible. The crucible never is emptied completely since sufficient metal is available to leave a heel of approximately 4 inches of molten metal after the operation. As may be observed in the accompanying illustrations the super-heating crucibles contain steel ears and lugs whereby they may be placed in and taken from the furnace by the use of hooks. However, before being taken to the pouring station the crucibles are placed in pouring shanks. Those are picked up with hoists suspended from monorails, and transported to any desired point.

Pouring Shed Ventilated

Pouring of molds is accomplished in a ventilated room or shed constructed of corrugated sheet steel. From there the molds pass through a ventilated cooling chamber also made of corrugated sheet. In that way all smoke and fumes are kept out of the foundry proper. From the end of the cooling chamber the molds are taken to any one of five vibrating shakeouts. As previously mentioned, the molds are left on the shakeout only until the casting is free from molding sand. Then the castings are moved to adjacent vibrating grids, as shown in Fig. 8, and left there until all the core sand has been removed. Vibrating grids for core knockout are the same type as those used for mold shakeout, and are shown just above floor level. A side hood attached to each grid provides a powerful exhaust which draws all gases, dust and dirt down and away from the vicinity.

Recently the Cincinnati magnesium foundry of Wright Aeronautical Corp. has been engaged in producing six aircraft engine castings, including the supercharger front section, rear housing, nose section, two types of oil sump, and the rear cover. Complicated construction is

(*Continued on page* 192)

SPECIFY "GENERAL CHEMICAL"

...dependability and uniformity in metal chemicals

STEEL

PICKLING . . . Sulfuric Acid—Hydrofluoric Acid—Muriatic Acid—Nitric Acid—Phosphoric Acid—Chromic Acid.

Detergents: Sodium Metasilicate—Trisodium Phosphate—Sodium Silicate—Tetrasodium Pyrophosphate.

RIMMING STEEL . . . Sodium Fluoride for smoother surface rimming steel.

COKE BY-PRODUCTS . . . Sulfuric Acid for making Ammonium Sulphate; for washing toluene, benzene, and for treating light oils.

FOUNDRY

Casting Cleaning Acid (Hydrofluoric Acid)—Sodium Silicate—Zinc Chloride—Polyacid Fluorides—Chromic Acid.

Sodium Fluoborate—Ammonium Fluoborate—Potassium Fluoborate, antioxidants and inhibitors.

Potassium Fluoride—Lithium Fluoride and other welding fluxes.

Fluoboric Acid: Solvent for silica, in cleaning surfaces.

HEAT TREATING

Sodium Cyanide—Sodium Fluoride—Sodium Cyanate—Potassium Cyanate.

METAL and ALLOY PLATING

Lead Fuoborate—Tin Fluoborate—Zinc Fluoborate—Cadmium Fluoborate—Copper Fluoborate, etc.

FOR METAL ANALYSES: **BAKER & ADAMSON REAGENTS AND FINE CHEMICALS**

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GENERAL CHEMICAL COMPANY

FOR AMERICAN INDUSTRY

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HANDLING with FEWER HANDS

You change Materials Handling from a slow, costly "necessary evil"—into a dynamic, useful servant of faster, better planned Production and Distribution—when you use

CLARK fork trucks

GAS AND ELECTRIC POWERED

To see the wide range of usefulness of Clark Tructractors and Fork Trucks, send for handy 72-page pocket catalog—describes 60 husky, well engineered vehicles, gas and electric powered.

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Products of CLARK • TRANSMISSIONS • ELECTRIC STEEL CASTINGS AXLES FOR TRUCKS AND BUSES • AXLE HOUSINGS • BLIND RIVETS INDUSTRIAL TRUCKS AND TRACTORS • HIGH-SPEED DRILLS AND REAMERS METAL SPOKE WHEELS • GEARS AND FORGINGS • RAILWAY TRUCKS

(*Continued on page* 190)

volved in producing these castings can be judged from the fact that the supercharger front section requires 60 chills of 5 different kinds and 17 cores. Poured weight of the casting is 167 pounds while the finished weight is 64 pounds. For a rear housing which in the finished form weighs 35½ pounds, the mold includes 17 cores and 182 chills.

Alloy used for the castings is composed of 5.3 to 6.7 per cent aluminum, 2.5 to 3.5 per cent zinc, 0.5 per cent minimum magnesium, 0.3 per cent maximum silicon, 0.05 per cent maximum copper, 0.01 per cent maximum nickel, 0.3 per cent maximum other elements, and remainder magnesium. Metal charges are composed of about 84 per cent remelt and 16 per cent ingot metal. All castings undergo solution and aging heat treatments to obtain desired physical properties.

For the six castings 62 different cores are made, ranging from small to rather sizable ones as may be observed in Figs. 3 and 4. As mentioned earlier 80 per cent of the cores are produced on core-blowing machines. Two types of machines are employed, a large one as shown in Fig. 9, and a smaller size. Other cores are produced by hand and on other types of coremaking machines as will be pointed out later.

Coreroom Is Divided

As indicated in Fig. 11 the coreroom is divided into halves, with much the same equipment in each and with the core drying ovens centrally located near one end. Two long conveyors of the suspended platform type carry the cores from the production stations through the ovens to the storage racks. Until recently two horizontal type, continuous ovens were sufficient to bake all the cores, but increase in production necessitated installation of a vertical type oven.

The horizontal ovens are 218 feet long and are oil fired. Baking temperature is 350 degrees Fahr., and time of baking is 4 hours. From the ovens the cores are carried on the platform type conveyors through a two-pass cooling chamber 120 feet long where they cool to nearly room temperature. Gases from the cooling chamber are removed with exhaust units. From the cooling chamber the cores are transferred to storage racks, or if urgently needed are carried on rubber-tired carts to the core humidity room for equalization to foundry conditions before use. The core humidity room atmosphere is maintained at a temperature of 80 to 85 degrees Fahr. with a relative humidity of 15 per cent.

Core storage department consists of a series of hand-propelled racks suspended from overhead monorail spur tracks. Each set of four or five spur tracks connects with an overhead rail switch to a return track. Each track accommodates four assembly storage racks. The racks are in five tiers, and each one will hold from ten to several

(*Concluded on page* 196)

What features do you want in a MOLDING MACHINE?

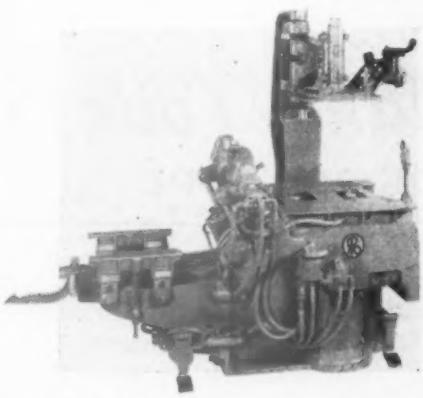
Doesn't the list above just about sum up the qualities you look for in molding-machines? Get them *all*, and you will have reliable, profitable equipment.

No matter what the type of work you have in mind, the SPO suited to your purpose will give you those eight essentials. The result, over a wide range of work, will be high production combined with accuracy, economy and profit. This is particularly true where your operators are beginners, for they can learn to operate simply designed SPO Molding Machines practically over night and "make out" accordingly.

If you will describe your needs, we shall be glad to send you the proper SPO bulletin.

No. 100 Series. Fast and flexible; ideal for matchplate molds. Can also be furnished in the post type.

No. 200 Series. Profitable for both jobbing work and fast production of cope and drag molds.



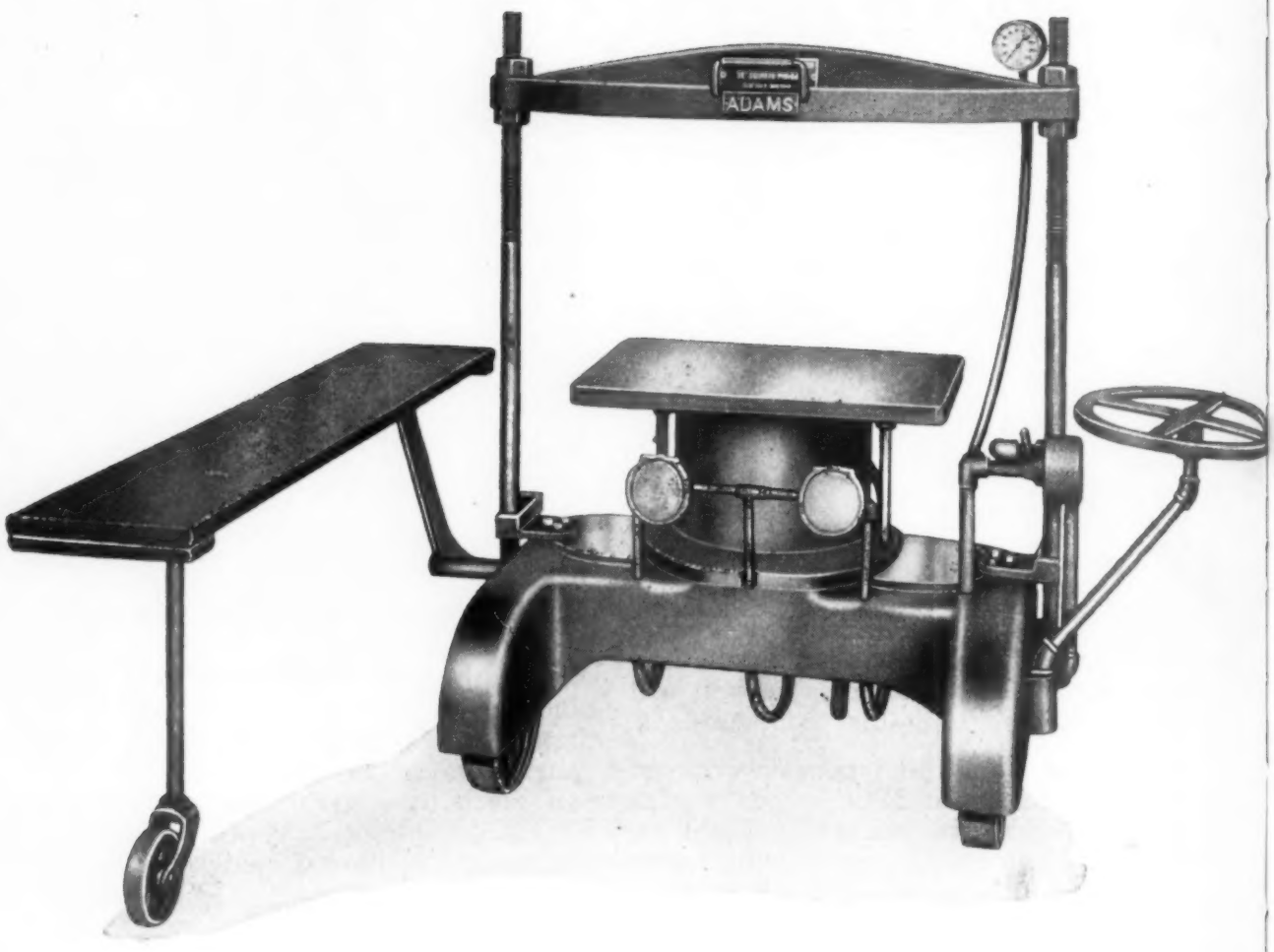
No. 400 Series. Squeeze operation eliminates hand butt-off, increasing output of drag molds.

SPO INCORPORATED

MEMBER MANUFACTURERS ASSOCIATION INC. FOUNDRY EQUIPMENT

Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production

7500 GRAND DIVISION AVENUE • • CLEVELAND 5, OHIO



The 12"-39" Adams Jolt Squeezer, Portable Type

Make Your Selection From This List

SIDE ROD TYPE PORTABLE OR STATIONARY	Squeeze Piston diameter	Jolt Piston diameter	Clearance between Side Rods	Pattern Draw, Adjustable
10"-32" Jolt Squeezer	10"	4"	32"	
12"-38" Jolt Squeezer	12"	5"	38"	
16"-42" Jolt Squeezer	16"	6"	42"	
10"-32" Universal Jolt Squeezer	10"	4"	32"	3" to 6"
12"-38" Universal Jolt Squeezer	12"	5"	38"	3" to 6"

Also Adams Hand Squeezers — 30", 34" or 38" between side rods — Portable or Stationary.

THE ADAMS COMPANY

MOLDING MACHINES · FLASK EQUIPMENT

The 10" Post Type Universal Squeezer, Portable Type

Adams Molding Machines

POST TYPE PORTABLE OR STATIONARY	Squeeze Piston diameter	Jolt Piston diameter	Pattern Draw, Adjustable
10" Post Type Jolt Squeezer	10"	4"	
12" Post Type Jolt Squeezer	12"	5"	
10" Post Type Universal Jolt Squeezer	10"	4"	3" to 6"
12" Post Type Universal Jolt Squeezer	12"	5"	3" to 6"

Also manufacturers of Snap Flasks, Slip Flasks, Jackets, Bands, Presser Boards, Bottom Plates, Upsets, Match Frames, Tubular Sprue Cutters and Vibrators

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QUIPMENT · Established 1883

WHEN SUMMER ADDS TO FOUNDRY HEAT...

PROVIDE SALT TO PREVENT "HEAT SICKNESS"—FURNISHED IN TABLET FORM TO MEN ON-THE-JOB WITH THIS EFFICIENT DISPENSER

The M·S·A Plastic SALT TABLET DISPENSER

The health and comfort of your foundry workers can be safeguarded in hot summer weather by providing salt tablets in conveniently located Dispensers—to replace body salt lost in excessive perspiration.

The M.S.A. Bakelite Salt Tablet Dispenser—1500-tablet capacity—is constructed of high-pressure molded bakelite, proof against corrosion and moisture, highly resistant to fracture or breakage. The Dispenser features easy, one-hand operation, providing one tablet at a time with each fractional turn of the dispensing knob. Write for prompt quotations.

★ M.S.A. Salt Tablets, of quick-dissolving standard 10-grain sodium chloride units, or combination tablets of sodium chloride (7 gr.) and dextrose (3 gr.), are supplied in convenient cartons of 500 or 1500-tablets.

MINE SAFETY APPLIANCES COMPANY
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District Representatives in Principal Cities
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(*Concluded from page 192*)

hundred cores depending upon the size. As each rack is unloaded it is pushed to the return track. In that way freshly baked cores gradually are brought to the adjoining assembly benches, with the cores baked first being used first. This prevents cores from being left on the racks too long.

Each type of core has a designated location on the racks and this has several advantages. One is that it makes it easy to maintain an accurate inventory; another is that the core assembler knows just where to obtain any core; also the rack operator knows the proper place to put the cores, and finally large and small cores are kept separated.

(*To be concluded next issue*)

Conducts Apprentice Contest

Entries for the annual apprentice contest of patternmakers and foundry molders conducted by the Cleveland Trade School under the auspices of the Foundry and Patternmaking sections of Associated Industries, Cleveland, opened May 7 and will close June 7. During the month apprentices entering the contest will make their patterns or do their molding under the supervision of Frank C. Cech, instructor in patternmaking at the trade school, and J. G. Goldie, foundry instructor.

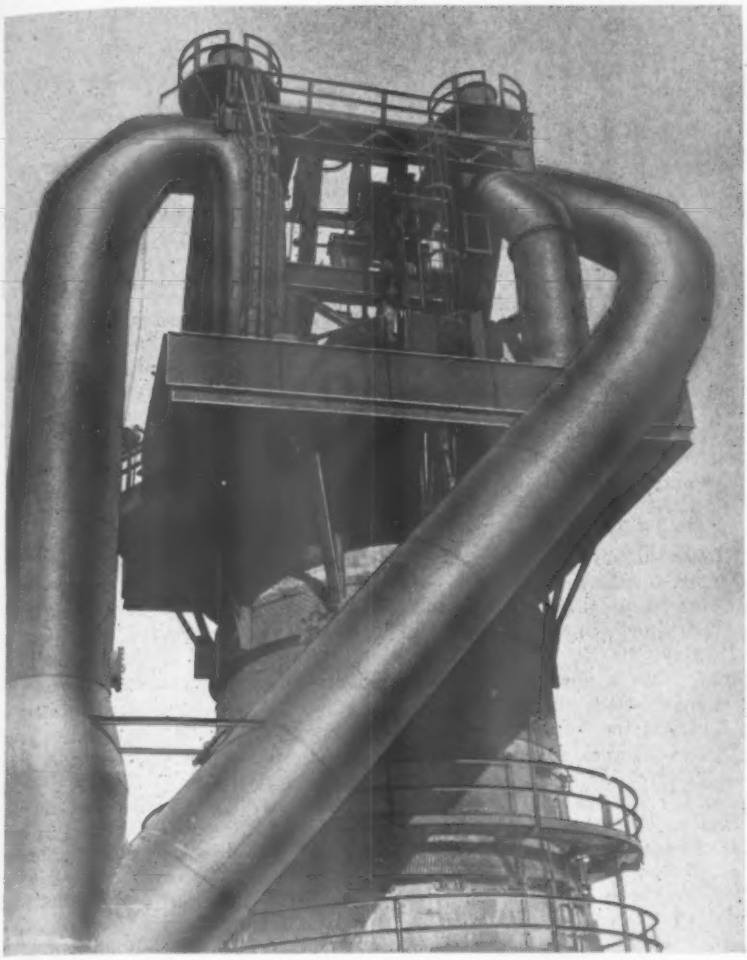
The work of winners in the Cleveland contest will be sent to headquarters of the American Foundrymen's Association for judging. Ordinarily judging is done in connection with the annual A.F.A. convention but this year, with the convention cancelled, it is replaced by a meeting of regional representatives who will judge the entries.

A.S.T.M. To Curtail Annual Meeting

Executive Committee of the American Society for Testing Materials, in full support of the war effort and in view of present restrictions on travel, has decided to confine the annual meeting to a one-day business meeting at Hotel Pennsylvania, New York, June 27. At the meeting the report of the Executive Committee will be received, results of the election of officers announced, and such reports of standing committees as require action will be presented. No technical sessions or any committee meetings will be held. Annual reports of standing committees and technical papers will be preprinted in the usual way for distribution in advance of the meeting.

Foundry Consultant

L. V. Tuttle has entered the consulting engineering field, specializing in operating problems of gray iron foundries, with offices at 506 Caswell building, Milwaukee 3. Mr. Tuttle has had 30 years of foundry experience.



The modern "Jisco" Silvery Blast Furnace at Jackson, Ohio.

·HIGH SILICON IRON·
"JISCO"

THIS MODERN BLAST FURNACE *produces* "JISCO" SILVERY PIG IRON

Virgin Ores are used as raw materials instead of scrap metals. This eliminates the possibility of alloy contamination.

Every drop of iron is filtered through a heavy bath of molten slag at 3000 F. The slag removes oxides, sulphur and other foreign matter.

PRODUCED in the BLAST FURNACE from VIRGIN ORES means *PHYSICALLY AND CHEMICALLY CLEAN*

A blend with "JISCO" improves operation and reduces costs.

Consult our Research Department

Andrew Jackson, the hero of the battle of New Orleans, led his men to victory in that historic struggle at the amazingly low cost of seven men killed and six wounded. Enemy losses were twenty-six hundred men.

THE JACKSON IRON & STEEL *Company*
JACKSON, OHIO.

The adventures of BILL

BY PAT DWYER
Drawings By RICHEY

ABOUT two bells in the first dog watch one day recently, Bill dropped into the galley where I am daily chained to the oar to do my modest share in getting THE FOUNDRY up to the jumping off place at the beginning of each month. As every person who ever engaged in a race knows, racing against a competitor either on two legs or on four is one thing, but racing against time, the most pitiless, inexorable of all competitors is something else again. I regret that Bill displayed a shocking disregard for this deplorable state of affairs. He helped himself to a pipeful of my tobacco, but carefully pointed out that he was a full time co-operationist—if there is such a word—in that he had his own pipe, and he thought, but was not quite sure, that he had a match. As a matter of cold, accurate and dispassionate fact a hurried search of all his pockets indicated that his supply of matches exactly balanced his supply of tobacco. Add nothing to nothing and what have you? Figures are wonderful things—animate or inanimate.

"Of course," he admitted handsomely, "I don't pretend to know anything about this here now writing racket, but it seems to me you should be ashamed to get in line and hold out your hand when the ghost perambulates down the line on pay day. You come in here every day, or on the days you ain't galivanting around the country, and knock off a few pages of tr—well let us say in all charity, a few pages. You write a few letters here and there and you always have an hour or two to spare for visitors, whom you entertain in the delightful manner in which you are now entertaining no less than the present speaker. Your comments on current events, although away off the beam now and again, are inspiring and highly appreciated. Your tobacco is so-so. The odor is not quite as penetrating, I should say off hand, as the bedding from a goat's nest, or a wisp of straw dipped in a preservative mixture of tar, sheep dip and formaldehide. I would not be too positive on that point. After a life time inhalation of core smoke, wood smoke and salamander fumes in the foundry, the nerve centers in the old beak are slightly atrophied —."

"You can say that again," I interrupted in my best radio manner, just to show him that I was keeping up with the times. "In fact you might play the string out to the end and admit that your thinking apparatus is in a more atrophied condition than the long, crooked and smoke consuming beak. You sit there and waste my time, smoke my tobacco and then without provocation of any kind, you comment on a job, the details of which you blandly admit, you know absolutely nothing. What would you think if an animated lump of ignorance ventured the opinion that your job was a sinecure?

"'Pon my word,' this imaginary jovial person says, 'I often wonder what a foundry superintendent does in his spare time. He has a well trained staff of skilled operators. He goes into the shop in the morning and tells each man what he is supposed to do. And that's all there is to it. Then he has all the rest of the day to himself. He must have a special gift of some kind to persuade the owners that he is necessary or entitled to a place on the pay roll'."

"Well," said Bill, "I'll tell you. Before this pussy footing bird comes hop, hop, hopping into my den with any of that kind of stuff in his beak, I should advise him in the most earnest manner to have a confidential chat with his local undertaker. I should not like to deprive him of whatever innocent pleasure he might have in indicating his choice between a public, or private funeral; flowers or no flowers; a simple parlor service, or a full and solemn requiem with bell, book and candle, a surpliced choir and a great organ booming out the *Dies Irae* until the building vibrates as a wooden bridge might vibrate from the passage of chariot wheels and screaming bugles."

"If you will be kind enough to pull over to the curb, hang your bugle on a hook and step down from your jallopy chariot for a minute or two, I shall have pleasure in showing you that you are just another."

"Another what?"

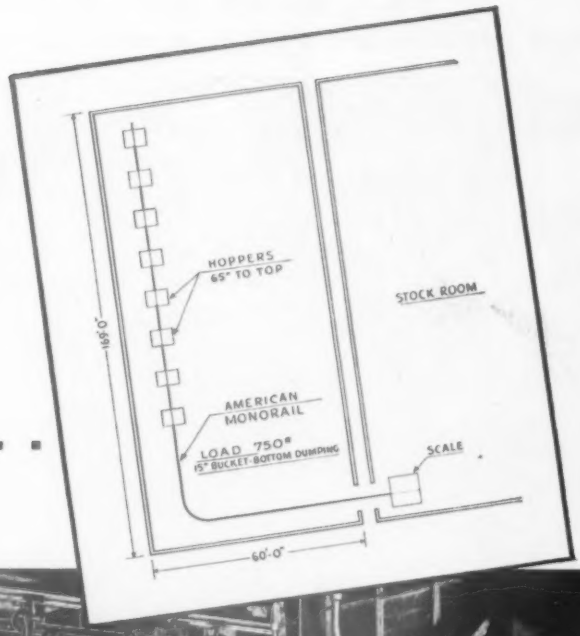
"Another one of those in that vast classification who—if you will pardon the expression—can dish it out, but who can't take it. Knowing nothing of any other job, the trials and difficulties, and noting the apparent ease with which it is handled, you calmly and

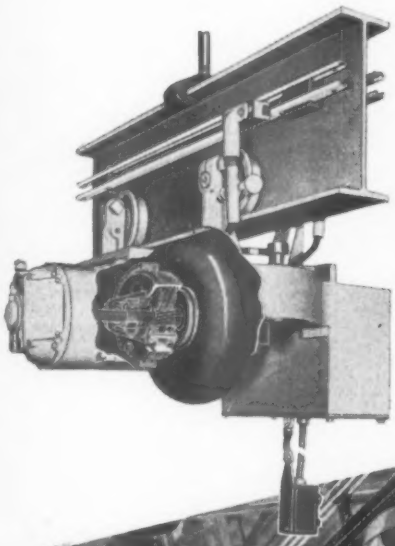
(*Continued on page* 201)

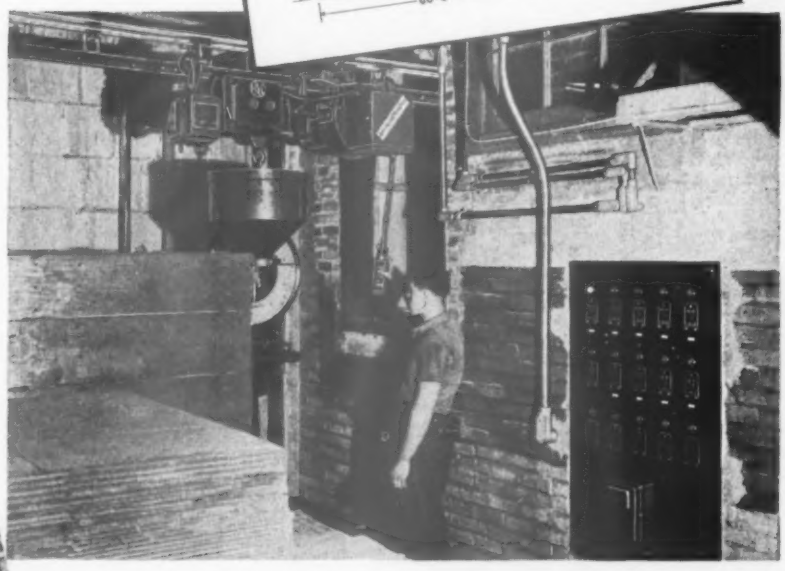
Help Wanted—Ladies' core room foreman. Strong and nimble. Several years experience as assistant to Frank Buck essential

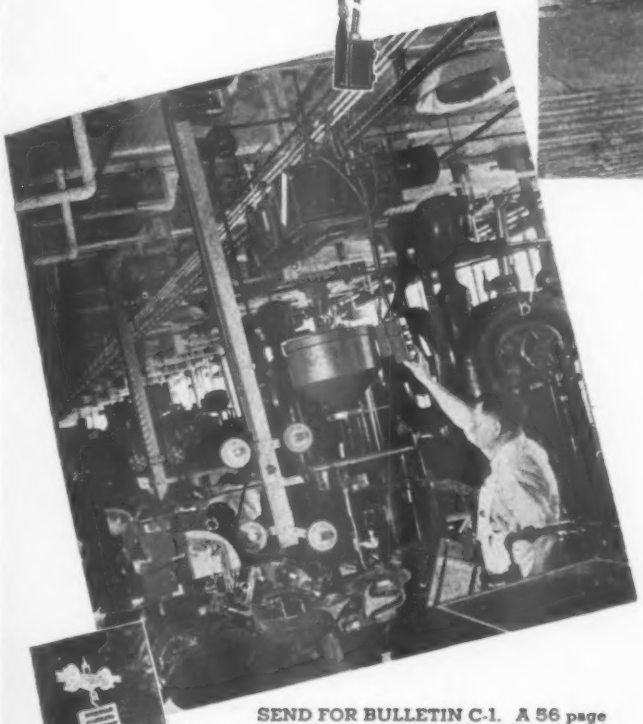
American Mono Tractor *Automatically*

Feeds 15 Stations . . . . .









SEND FOR BULLETIN C-1. A 56 page book showing successful applications of American MonoRail Systems.

HERE is an American MonoRail System that is almost human. By remote control, semi-precious metal is delivered to fifteen tube-forming machines.

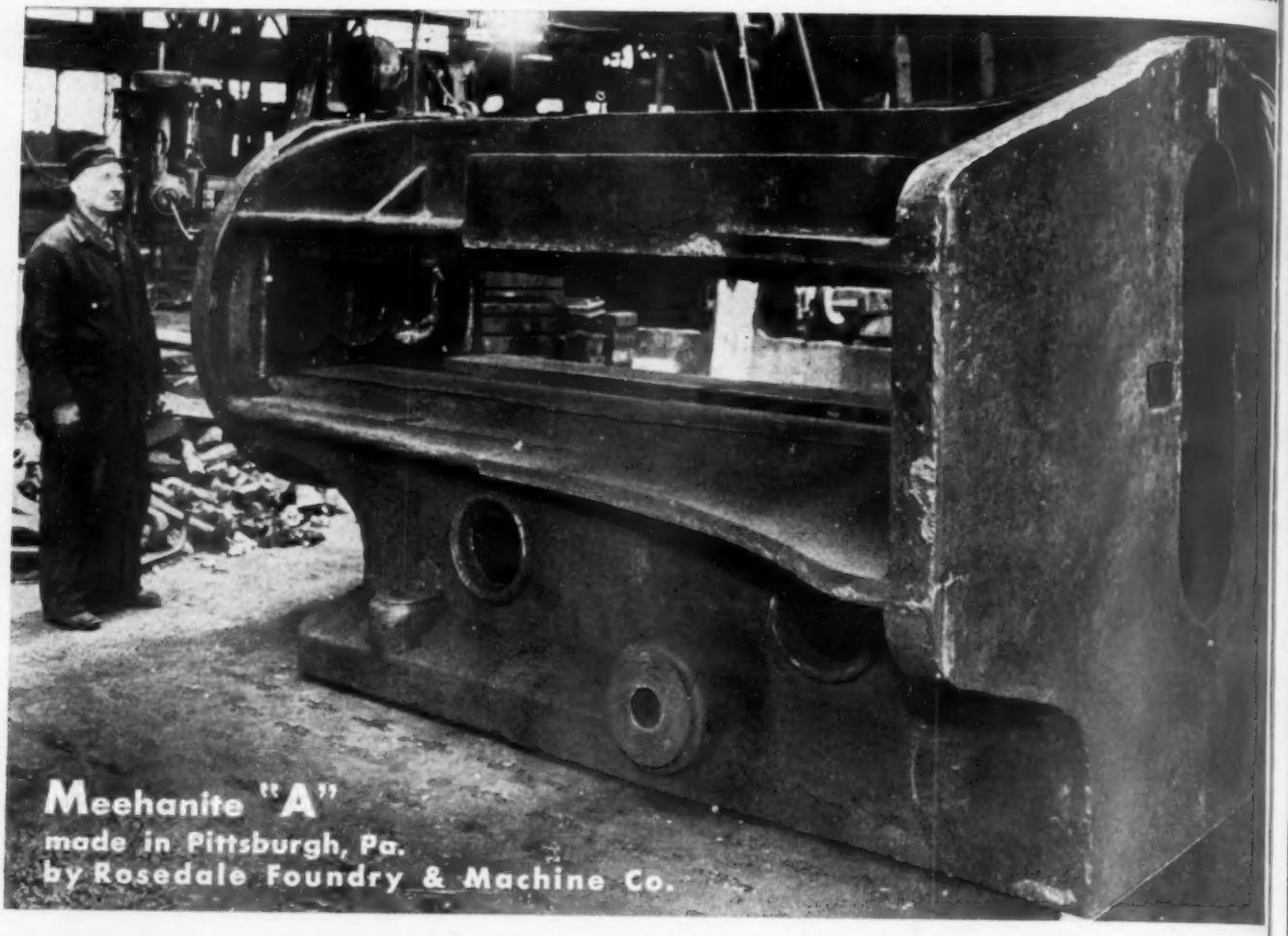
After dispatcher fills container with slugs he carefully check-weighs the load and dispatches it to one of the 15 machines. Operator at machine where carrier stops automatically unloads the metal slugs by push-button control and returns carrier to central station. All handling operations are performed through signal lights and push-button switches. American MonoRail Systems are not all so complicated. But all do the handling job for which they are designed — better, quicker and at great saving in cost. An American MonoRail engineer will gladly tell you how it will work in your plant.

THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVE. **CLEVELAND 7, OHIO**

RIGHT COMBINATION

LION BINDER and PITCH in cores and molds—VULCAN BLACKING on both to insulate



Meehanite "A"
made in Pittsburgh, Pa.
by Rosedale Foundry & Machine Co.

Semi-Steel
made in Philadelphia, Pa.
by Schneider-Bowman Co.

LION BINDER, PITCH AND VULCAN BLACKING MANUFACTURED BY

J. S. McCORMICK CO.
PITTSBURGH, PA.

(*Continued from page* 198)

ignorantly jump to the conclusion that it runs along practically by itself. The head man is about as useful and necessary as the top, left hand button on your overcoat. You might not actually say so, but in your secret mind you are quite certain that you could do the job as well, and perhaps a little better, if you had the opportunity. In idle moments you speculate on where you might have landed, if you only had displayed better judgment in selecting a father or grandfather who would have started you at the bottom of the ladder, where you could learn the business and in three months advance to the position of vice president or maybe—"

"You can leave my father out of this," Bill said with a marked lack of cordiality. "He did not leave me a fancy job or a crock of gold for the very simple

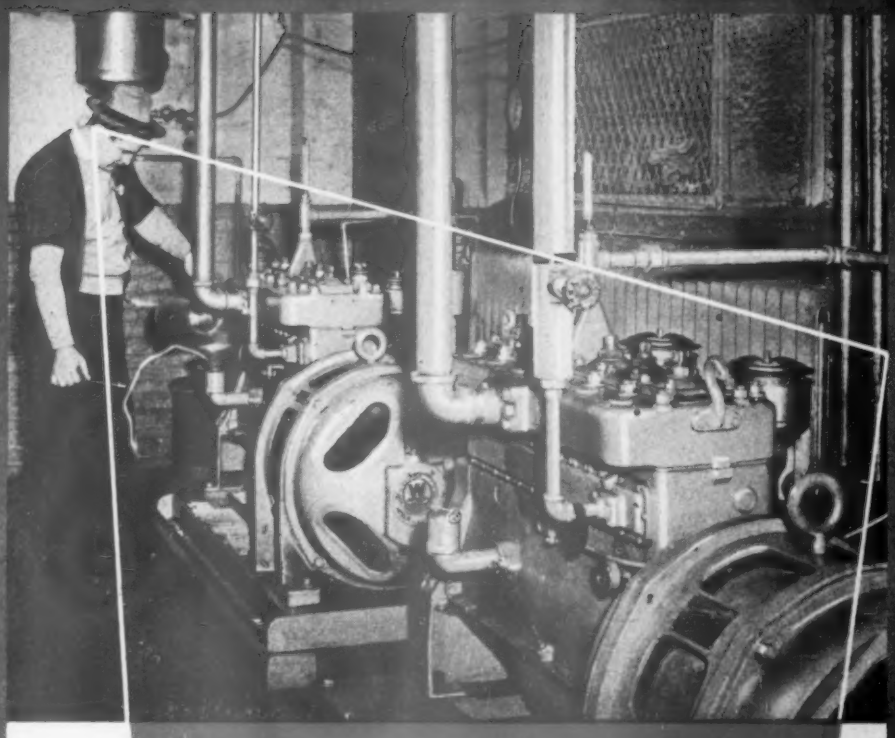
What did Aesop say about the Ant and the Grasshopper

reason he never had either one or the other for himself. And yet if I was given the chance again of selecting a father he would be my first choice. He clung to the rather singular belief that if a man stood by the Golden Rule he would not go very far astray. He despised sycophants, bluffers, bullies and parasites. He would no more think of fawning upon a man or woman temporarily sitting in a high chair, than he would of taking a back handed slap at a poor unfortunate creature temporarily down and out."

"All very fine and noble," I admitted, "but I am afraid your respected Papah did not inoculate you thoroughly, or you would not have shown such a vindictive attitude toward the mythical character who made light of your cares and responsibilities."

"Why shouldn't I feel vindictive? Listen. I cannot truthfully say that this day has been any worse than others which have preceded it or others that inevitably will come after it. It has

(*Continued on page* 204)



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IN UNIT SYSTEMS

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Something to look forward to

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During four long years of expanded effort to meet the requirements of industry at war, Peninsular field and research engineers have constantly pressed their search for new materials — new methods — better ways to manufacture grinding wheels and apply them to the problems of production.

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SPECIALISTS IN RESINOID BONDED WHEELS

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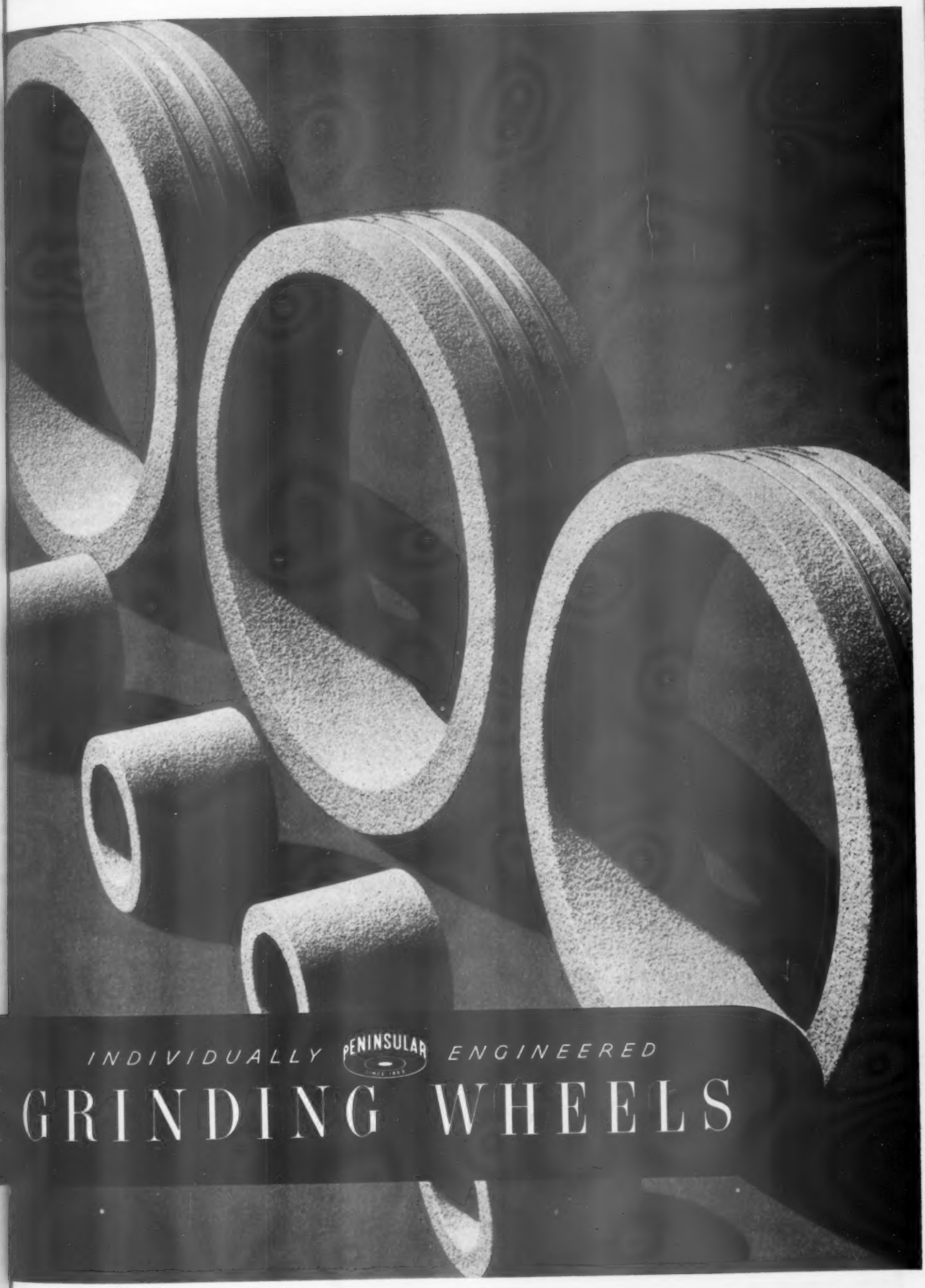
Cylinder wheels for various types of surface grinding


INDIVIDUALLY PENINSULAR ENGINEERED
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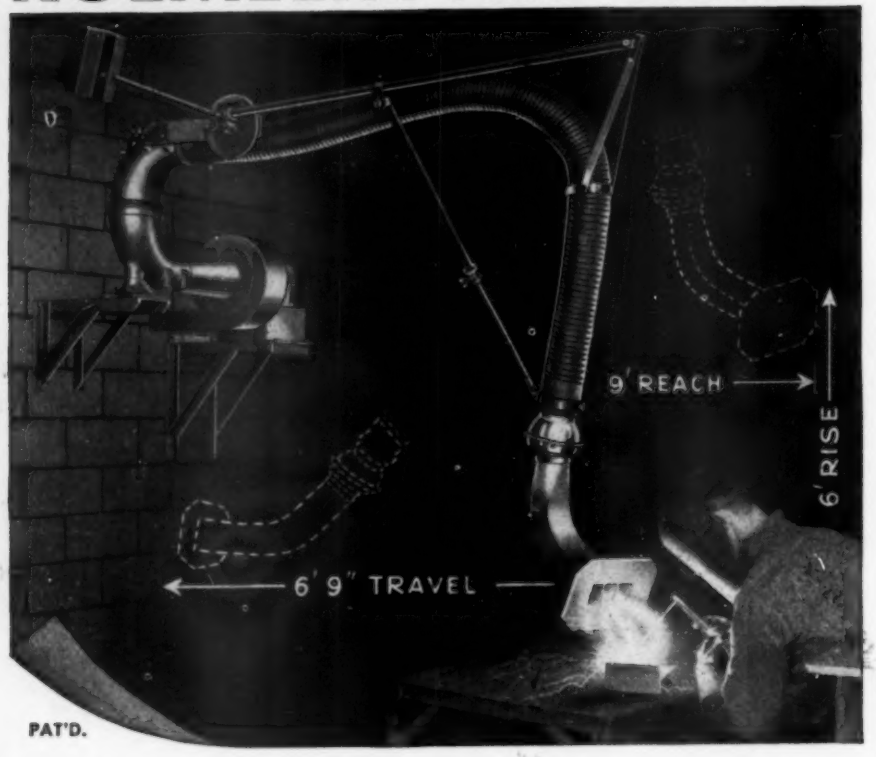
RUEMELIN Fume Collector



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No longer need your employees inhale welding fumes. A Ruemelin Fume Collector solves the problem, quickly and efficiently. It produces a powerful suction that draws out noxious gases, smoke and heat *at the source*. Guards employee health, resulting in less welder fatigue, therefore greater plant output. Has many exclusive features: (1) Clears shop air with minimum loss of building heat. (2) Exhaust snout can be positioned instantly and conveniently. (3) Covers maximum welding territory, vertically, horizontally and by circle swing. (4) Shipped completely assembled, easy to install. Thousands of Ruemelin Fume Collectors now serving war industries everywhere. 9 ft. and 15 ft. sizes available.

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MANUFACTURERS AND ENGINEERS

SAND BLAST AND DUST COLLECTING EQUIPMENT, WELDING FUME COLLECTORS

A 4709-⅔

(*Continued from page* 201)

been just typical, that's all, just typical. I know many other words in which I could describe it to better advantage, but I am all in and we will just let it go as typical. Listen for a minute while I touch on a few of the high spots that helped, you might say to relieve the day's performance of any tendency toward *ennui*.

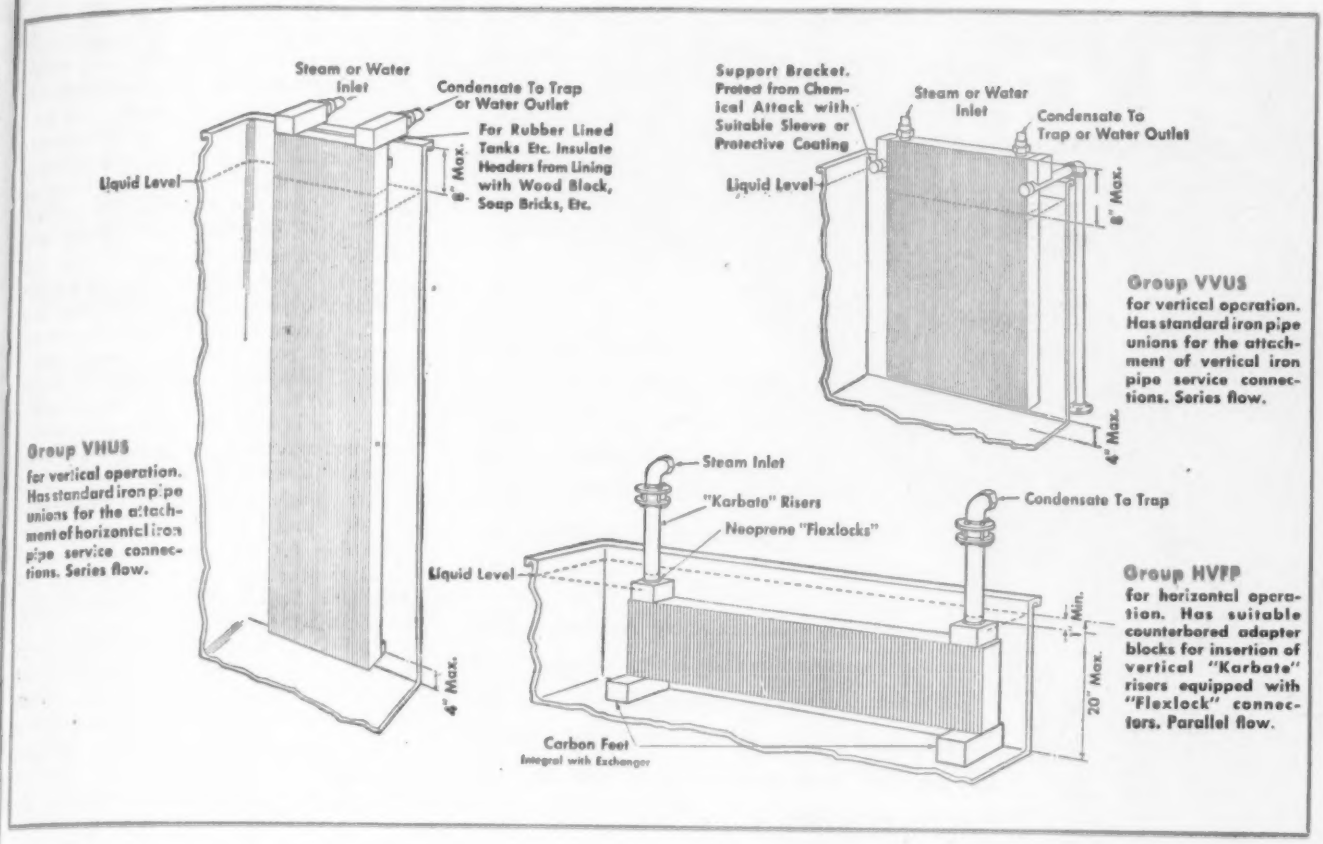
"The watchman got tanked last night to such an extent that apparently he did not know his right hand from his left, but of course as is usual in such cases, a trifle like that caused him no uneasiness, or did not disturb his night's sleep. He was instructed to shut off the oil in the core oven burners at 10 p.m., but the burners in the mold oven to be left burning all night. Evidently he retained some glimmerings of intelligence for a few hours in the fore part of the night. Intelligence or instinct, I don't know whether I should call it one or the other. But call it by what name you will, it prompted him to shut the heat off in one oven and leave it on in the other. So far he followed instructions as well as any human being reasonably might be expected to follow them. In fact the only point on which he technically was open to censure was that the pickled Yahoo shut the heat off in the wrong oven.

"As a result the cores were burned to ashes in one oven and the molds in the other oven were almost as green in the morning as they were when they were loaded on the cars the preceding afternoon. The coremaker profanely reported the catastrophe to me in the morning and then piously suggested that it would be a holy and a wholesome thought to spear the watchman and toast him to a crisp over a slow fire. I told him he had my unequivocal and enthusiastic permission to go as far as he liked, and as an after thought I suggested that he hang him head down.

"About an hour afterward while the cupola tender was engaged in chipping away the ridge of slag above the tuyeres, a brick in the vicinity of the charging door sill became dislodged and struck him on the head in its descent. Had it fallen flat it probably would have bounced off, as many others had bounced off the old lad's knob in his early days when he had considered it his duty and his privilege to engage in as many controversial parades as possible. In this instance the brick fell in such a manner that a sharp corner made a three corner dent in his scalp. He was carried fainting into the office and after a little first aid treatment, internal and external, he insisted he did not feel equal to returning to the job until the following day. In this land of the free and the home of the brave you cannot make a man work if he does not want to work. I had to depend on his assistant to get the cupola ready for the day's heat

"This assistant was willing enough and since he had been helping the

(*Continued on page* 206)


Steam or Water Inlet
Condensate To Trap or Water Outlet
For Rubber Lined Tanks Etc. Insulate Headers from Lining with Wood Block, Soap Bricks, Etc.
Liquid Level
8" Max.
Group VHUS
for vertical operation. Has standard iron pipe unions for the attachment of horizontal iron pipe service connections. Series flow.
4" Max.
Support Bracket. Protect from Chemical Attack with Suitable Sleeve or Protective Coating
Steam or Water Inlet
Condensate To Trap or Water Outlet
Liquid Level
8" Max.
Group VVUS
for vertical operation. Has standard iron pipe unions for the attachment of vertical iron pipe service connections. Series flow.
4" Max.
Steam Inlet
"Karbate" Risers
Neoprene "Flexlocks"
Condensate To Trap
Liquid Level
Min.
20" Max.
Group HVFP
for horizontal operation. Has suitable counterbored adapter blocks for insertion of vertical "Karbate" risers equipped with "Flexlock" connectors. Parallel flow.
Carbon Feet
Integral with Exchanger

CAN YOU SPECIFY THE REQUIREMENTS FOR A GOOD HEAT EXCHANGER FOR TANKS?

That is, the requirements for a heater or cooler of corrosive liquids in tanks for pickling, etching, plating, cleaning, or other services in the chemical and metal industries.

You'll say:

Resistance to strong corrosive chemicals.
High heat transfer ability.
Strength.
Shock resistance, both mechanical and thermal.
Adaptability to your tanks.
Convenient mountings and connections.

National Carbon has developed a number of standard "Karbate" Plate Heater designs that fully satisfy all of these requirements. These designs, three of which are illustrated above, are simple assemblies of sturdy "Karbate" Plate Heater Units. ("Karbate" material is impervious carbon or graphite.)

Within each unit tubular channels are provided for the heating or cooling medium. On the exterior, corrugations provide maximum surface for heat transfer. Finished assemblies come with various types of mountings and adaptable, easy-to-assemble connections.

For information on "Karbate" Plate Heat Exchangers and "Karbate" Bayonet Heaters, write our nearest Division Office for Catalog Section M-8804.

The word "Karbate" is a registered trade-mark of National Carbon Company, Inc.
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You get the results of half a century of invention, tests and improvements from our modern research laboratory. And, this same laboratory is open to you—tell us about any grinding problem you have and our engineers will tell you how best to whip it.

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Whether you turn out fighting equipment for Uncle Sam or are re-tooling for peace-time production, you'll find Chicago Wheels just what you've been looking for to produce better, smoother finishes.

GRINDING WHEELS up to 3" in diameter in various bonds, including the new FV, the bond with a pedigree.

MOUNTED WHEELS in every practical shape, grain and grade, each firmly mounted on a steel shank.

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Name .....

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(*Continued from page 204*)

regular cupola tender for some time I assumed that all he needed was a few general instructions. In the excitement of his first responsible position he forgot to ram a sand bed on the bottom. He dumped the shavings and kindling wood directly onto the iron bottom doors. The mistake was not noticed until after the fire was lighted and sparks commenced to drop through the openings. We had to drop the bottom and start over again. About 3 p.m., two of the lady coremakers got in a clinch over the possession of a core plate. When I arrived on the scene I found the entire force taking part in the quarrel to the best of the ladies' vocabulary, and believe me those ladies could talk. I had to threaten to fire the entire gang before peace—comparative peace—was restored, and I could learn who was responsible for the uproar. You would think the foregoing furnished enough excitement for one day. Listen. You ain't heard nothing yet.

"I hurried from the core room to the charging deck to see how the work was going up there. I should not have been at all surprised to find that one of the gang had dropped a fat pig on his toes, or had been run over by a charging buggy. I was agreeably astonished to find everything proceeding peacefully. Crossing my fingers I started down the stairway only to meet a wild eyed wop dashing madly up the stairs in search of 'da Boss.' The only words I recognized out of the torrent he sprayed at me were 'De Derk! Da Derk!' I followed him out to the stock yard and found another wreck.

"Contrary to constantly repeated instructions, the gang of huskies had hung a load on the derrick beyond all reasonable limits. The boom had carried the load while in an almost vertical position. When the operator lowered the boom to an almost horizontal position and then attempted to swing the load, two of the guy ropes parted and the mast came smashing down on top of the operator's shanty. Fortunately no person was killed or crippled, and I suppose I should have been overwhelmed with relief at the discovery. My first feeling was one of relief, but my second, I regret to say, was one that never would have earned me a martyr's crown. I don't think I am any more vindictive than the average citizen, but I don't believe I would have shed a tear if the whole misbegotten gang had been driven into the ground like so many piles."

Actuated solely by the laudable intention of cheering him up, I told Bill he should not be unduly downhearted over trifles. I quoted the well known saying that into every life some rain must fall and all that kind of thing. Besides it was all in the day's work. A job would be dead and monotonous if it was not for a little variety once in a while.

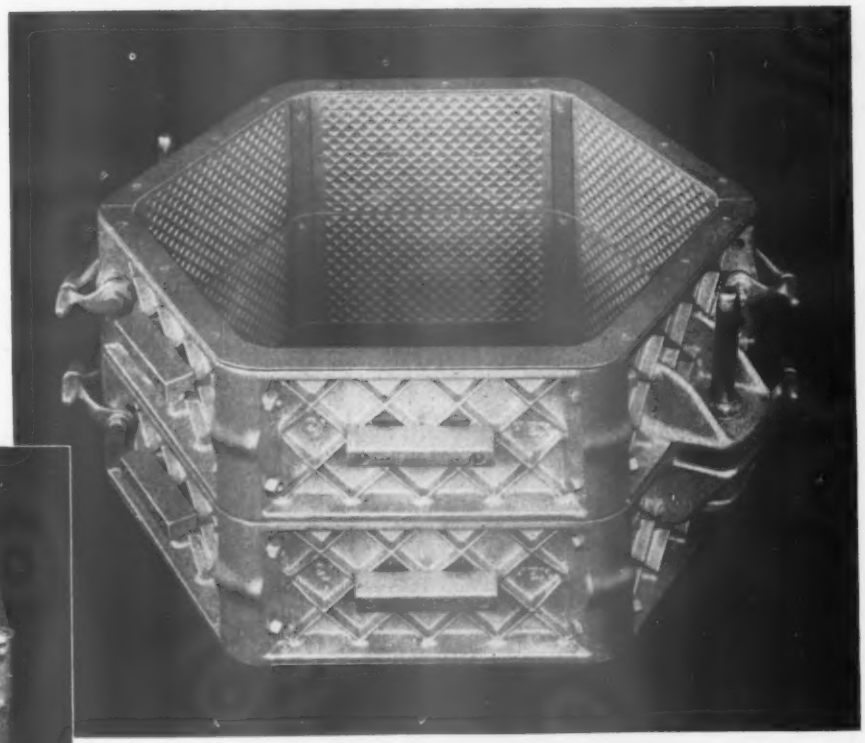
"Monotonous?" said Bill. "Believe me, kid, if lack of monotony is all that is

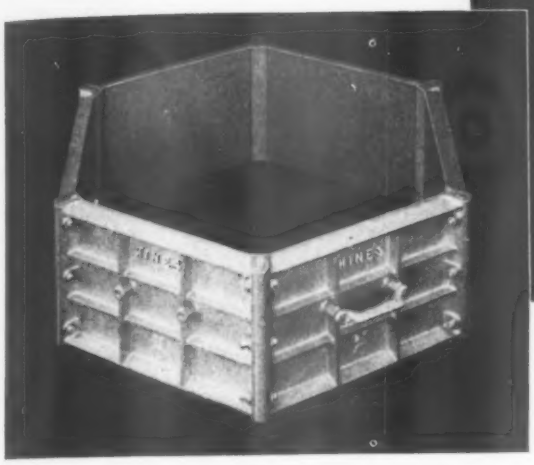
(*Concluded on page 208*)

HEXAGONAL "POP-OFF" FLASK

TRADE-MARK

...Developed by Hines in solving another "special" casting problem!





HEXAGONAL JACKET

● Time and time again Hines engineers have solved casting problems for foundrymen by developing a special flask for a specific job. These "specials" often put jobs on a production basis that were first thought impractical if not impossible. The hexagonal flask illustrated above incorporates the exclusive "Pop-Off" feature. It will never require pounding or mauling to remove it from the mold. The serrations on the inside walls anchor the sand so firmly that sag, drop and shifts are definitely eliminated. There are no sand strips to get out of order. In addition to doing its "special" duty most efficiently this Hexagonal "Pop-Off" will prove extremely valuable for a wide variety of similar work. Hines engineers will be glad to recommend the proper flask and jacket equipment for you, there is no obligation.

EXCLUSIVE
BUILDERS OF FLASKS
AND JACKETS FOR OVER
25 YEARS

THE HINES FLASK CO.

1324 HIRD AVENUE **CLEVELAND 7, OHIO**

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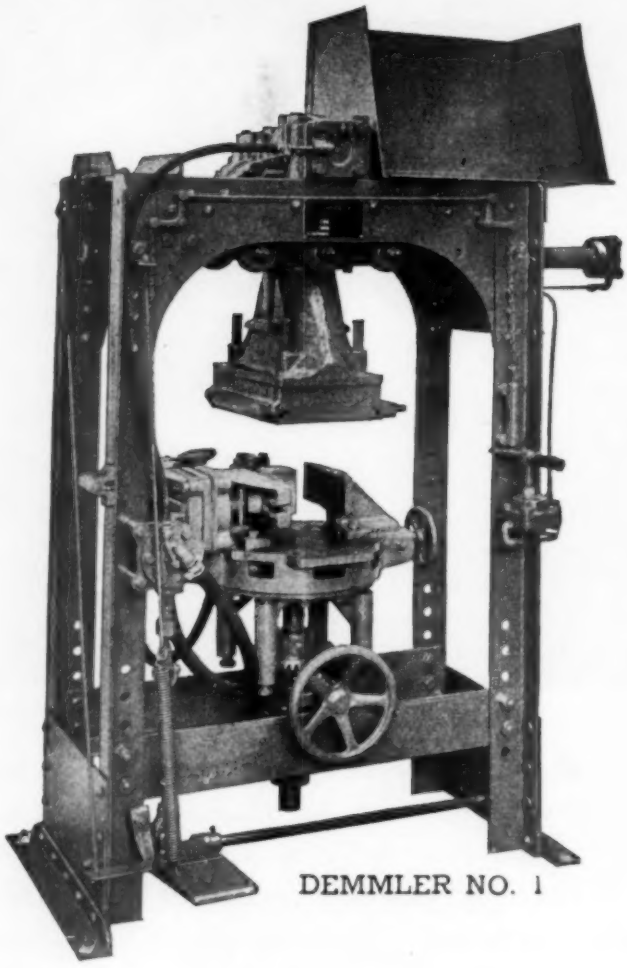
DEPENDABLE **CORE BLOWING** EQUIPMENT



DEMMLER NO. 1

This unit designed especially for small core work such as plumbing goods, electrical fittings, stove burners, valves and small pipe fittings. Ideally suited to quantity core production on all types of small brass, malleable, and gray iron work. Detailed specifications on this or other models on request . . . a type and size for every core blowing need.

WM. DEMMLER & BROS.
KEWANEE, ILLINOIS

CORE BLOWERS *Exclusively*

(*Concluded from page 206*)

required to keep a business alive, the foundry business is one that never will die. There is more variety to the square inch in a foundryman's life than there is to the square mile in the existence of any other created human being. He is constantly between the devil and the deep blue and salty sea. In his endeavor to escape the prongs of the pitch fork in the hands of one, he jumps into the other and has salt rubbed into his wounds. When his order book is full he cannot get men. When men are plentiful, all the orders go into hiding. If he rigs a plant to make light castings, he discovers that the only customers in the country who want any castings are manufacturers of rolling mill machinery. If he installs equipment for handling heavy work, he may consider himself lucky if he does not find his 50-ton crane half the time engaged in lifting copes from flasks that would have been lifted by hand by a pair of old time molders.

"When every other source of trouble fails he always can rely on the designer of new machinery to demand something in the way of a casting that is in direct opposition to every foundry principle and every law of nature. At other times he designs a casting in such a manner that the foundry expense is out of all proportion to what it should be, or to what it would be if the foundryman had been consulted before the pattern was ordered. Sometimes a pattern that is quite suitable under one set of conditions is of no service under a changed set of conditions.

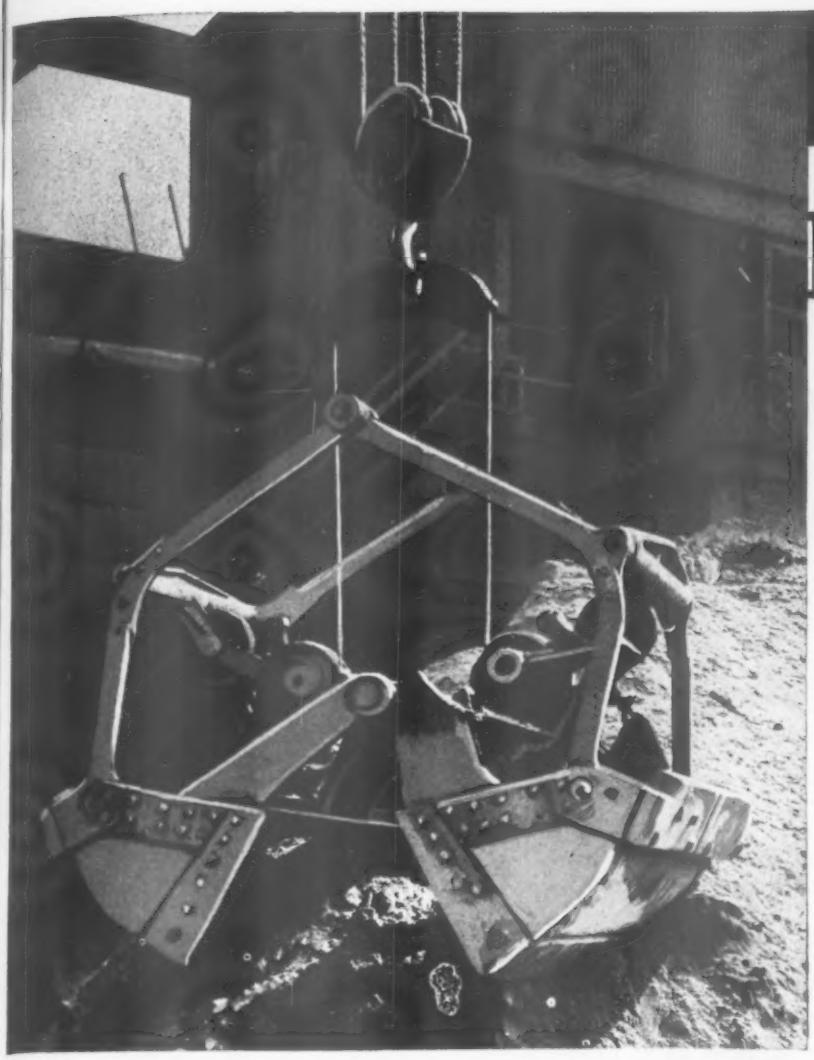
"Well, so long. I'll take a gander back to the old dump and see if the roof and walls are still standing, also what kind of a headache has been hatched up for me tomorrow."

Management Course

A three-week management course will be conducted by University of Iowa's College of Engineering at Iowa City, June 11 to 29. It will be devoted to the study of production planning, plant layout, motion and time study, wage incentives and related subjects, and is intended for plant managers, foremen, industrial engineers, methods and time study analysts, cost accountants and office executives.

This will be the seventh year for the university's summer management course which stresses those fundamental principles and techniques which can be used to bring about the improvement of production methods. The course will be directed by Ralph M. Barnes, professor of industrial engineering, to whom registration and communications should be sent. Tuition and laboratory fee is $150.

Stockholders of the Westinghouse Electric & Mfg. Co., Pittsburgh, at their recent annual meeting voted to change the company's name to Westinghouse Electric Corp.



EXTREMELY LOW HEADROOM

Designed Especially for Foundry Requirements

Blaw-Knox No. 309-F is a bucket whose exceptional width and limited closing power prevents it from digging into the foundry floor while handling moulders' sand, coke, etc. Its unique design permits fast and efficient operation in headroom as low as 6 ft. 7 ins. . . . Made in four sizes from ¾ to 4 cu. yd. capacity . . . For complete data on this and other Blaw-Knox Single Line Hook-on types, write for Catalog No. 2002.

Blaw-Knox Roller Gate Bucket

Where it is desirable to fill cores individually, this Controllable Discharge bottom dump bucket is fast and efficient. The discharge gate is opened or closed by an easy movement of the hand-operated lever. Illustrated is No. R-62-X Single Line Hook-on type of 2 yds. capacity.

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of Blaw-Knox Company
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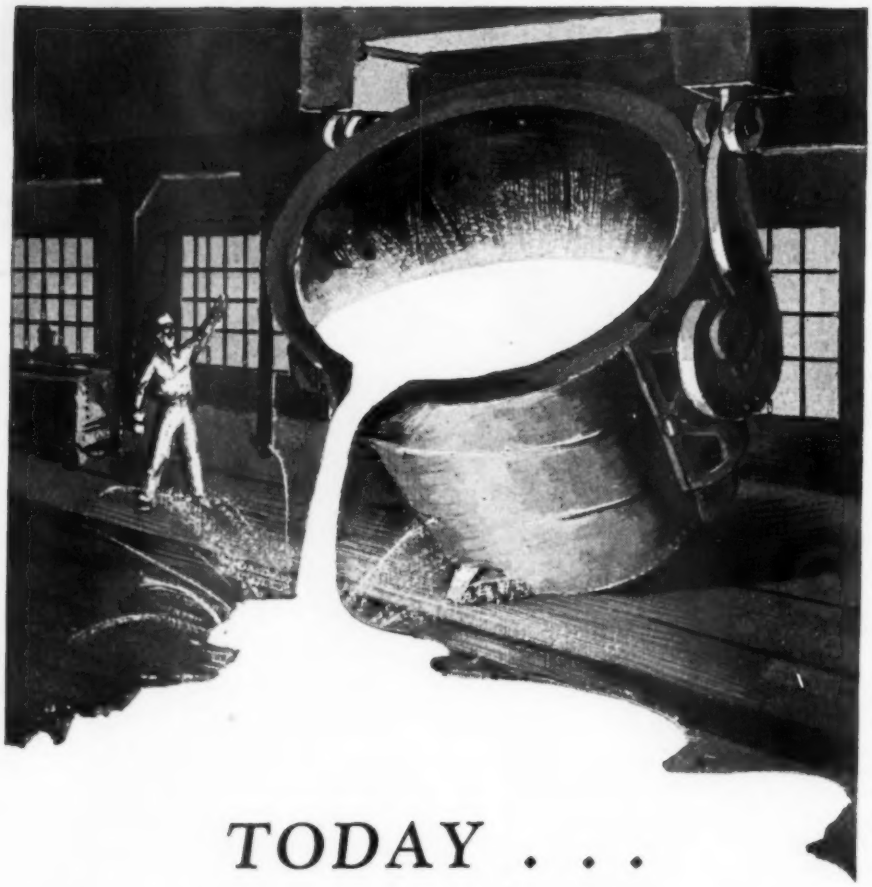
Representatives in Principal Cities

ARMY NAVY

6 plants of Blaw-Knox Company have been awarded the Army-Navy "E" for excellence

BLAW-KNOX CLAMSHELL BUCKETS



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BUFFALO 17, NEW YORK

OBITUARY

WILMER W. YOUNG, 45, foundry superintendent, Skagit Steel & Iron Works, Sedro-Wooley, Wash., died April 16 in that city. Before joining the company in 1942, Mr. Young was affiliated with Stanford University for 10 years where he taught foundry practices in the School of Mechanical Engineering.

• • •

J. Ray Mathews, 46, eastern representative for E. J. Woodison Co., Detroit, died recently. Mr. Mathews, a member of Central New York Chapter of the American Foundrymen's Association, was well known to foundrymen throughout central and eastern New York and western Pennsylvania.

• • •

Edmund A. Doyle, 64, consulting engineer for the Linde Air Products Co., a unit of Union Carbide & Carbon Corp., New York, and a former president of the American Welding Society, died May 4 in that city.

• • •

John H. Champion, 71, retired foundry superintendent, Nordberg Mfg. Co., Milwaukee, died April 30 in that city. Three years ago Mr. Champion was awarded a plaque by the American Foundrymen's Association in recognition of 50 years service as a foundryman.

• • •

Edwin G. Howell, 55, for the past 8 years associated with John T. McEnroe Co., Chicago, died April 12 in that city. Mr. Howell was well known in the Chicago scrap business which he entered at the end of World War I.

• • •

Rollin C. Shurmer, sales manager for Lake City Malleable Co., Cleveland, died April 28. He had been associated with the company for 35 years.

• • •

Charles W. Shartle, 53, vice president and sales manager of the Texas Electric Steel Casting Co., Houston, Tex., died April 25.

To Study Lighting

Illuminating Engineering Society, New York, recently appointed a Subcommittee on Lighting in Foundries which will conduct research on that problem with the view of setting up proper standards for efficient lighting in various departments of the foundry. Members of the committee include those from the society and from the foundry industry, and are: Frank E. Mueller, Cleveland Electric Illuminating Co., Cleveland, chairman; Charles W. Briggs, Steel Founders' Society of America, Cleveland; W. E. Conley, General Electric Co., Cleveland; A. J. Edgar, Gray Iron Founders' Society, Washington; James H. Lansing, Malleable Iron Founders' Society, Cleveland; Thomas W. Rolph, Holophane Co., Newark, O., and F. C. Winkler, Westinghouse Electric & Mfg. Co., Cleveland.

Major PRODUCTION Operations
DEMAND THE BEST
And "the best" in Chaplets, Chills and Superchills (patented) has long been identified with the fine old name of Fanner.
Today, more than ever, when there can be no compromise with either time or quality in turning out the best possible castings in the shortest possible time, the need for these vital Fanner products is a very essential "must" in every successful production speed-up.
Our engineering experience is "at your service" in helping you take full advantage of speeding up your casting program with Fanner Chills, Chaplets and patented Superchills. Call on us.
PRODUCE for VICTORY, but PLAN for PEACE

THE FANNER MANUFACTURING CO.

Brookside Park, Cleveland, Ohio • The Canadian Fanner, Ltd., Hamilton, Ontario

Foundry Statistics

Malleable Iron Castings

	Production (Tons)			New Net Orders (Tons)		
	1945	1944	1943	1945	1944	1943
Jan.	83,742	75,594	63,572	97,153	93,855	73,524
Feb.	78,385	74,812	66,401	79,913	79,352	87,728
Mar.	86,175	81,480	78,143	98,979	90,038	85,744
Apr.	.....	69,820	72,559	.....	88,169	74,241
May	.....	70,555	69,939	.....	92,285	77,768
June	.....	70,993	69,111	.....	103,692	78,289
July	.....	61,320	66,011	.....	106,626	91,653
Aug.	.....	74,297	67,615	.....	71,307	108,303
Sept.	.....	74,628	74,874	.....	49,502	99,911
Oct.	.....	80,505	74,254	.....	76,336	101,510
Nov.	.....	79,629	72,077	.....	48,149	93,370
Dec.	.....	76,187	75,188	.....	69,972	81,978
Total	.....	889,820	849,764	.....	969,483	1,064,224

Steel Castings

	Shipments (Tons)		Production (Tons)		New Net Orders (Tons)	
	1945	1944	1945	1944	1945	1944
Jan.	201,162	237,570	157,176	159,795	210,182	167,739
Feb.	.....	211,958	.....	161,359	.....	173,592
Mar.	.....	224,913	.....	174,626	.....	162,575
Apr.	.....	204,279	.....	155,778	.....	175,053
May	.....	210,360	.....	161,783	.....	176,998
June	.....	200,237	.....	157,444	.....	181,810
July	.....	176,735	.....	131,940	.....	169,921
Aug.	.....	204,833	.....	154,911	.....	171,309
Sept.	.....	189,443	.....	144,458	.....	129,847
Oct.	.....	197,772	.....	150,719	.....	146,116
Nov.	.....	196,475	.....	146,411	.....	120,667
Dec.	.....	190,846	.....	144,162	.....	138,668
Total	.....	2,435,421	.....	1,843,386	.....	1,914,294

Note: Shipments for sale and own use; production and orders for sale only.

Aluminum Casting Shipments

(In millions of pounds)

	Total	Sand	Perm. Mold	Die
1943	459.5	304.2	89.6	65.7
Jan.	33.1	21.9	6.4	4.8
Feb.	33.3	22.0	6.5	4.8
Mar.	38.7	25.3	7.9	5.5
Apr.	37.1	24.3	7.6	5.2
May	37.7	25.0	7.7	5.0
June	36.3	24.1	6.9	5.3
July	37.2	24.7	7.1	5.4
Aug.	38.2	25.4	7.2	5.6
Sept.	40.8	27.2	7.9	5.7
Oct.	42.7	28.5	8.0	6.2
Nov.	43.0	28.5	8.3	6.2
Dec.	41.4	27.3	8.1	6.0
1944	514.5	321.1	106.3	84.2
Jan.	44.1	29.4	8.3	6.4
Feb.	45.9	30.2	8.0	7.5
Mar.	49.5	31.4	9.6	8.1
Apr.	42.9	27.0	8.3	7.3
May	44.7	27.9	8.9	7.5
June	42.4	25.9	8.8	7.4
July	38.7	24.5	7.7	6.2
Aug.	43.2	26.9	9.2	6.9
Sept.	41.5	25.5	8.9	6.9
Oct.	42.1	25.1	9.8	7.0
Nov.	40.5	24.3	9.6	6.4
Dec.	39.0	23.0	9.2	6.6
1945				
Jan.	43.5	25.3	10.6	7.3
Feb.	42.0	24.9	9.7	7.2

Foundry Equipment, Supplies

(In thousands of dollars)

	Shipments	Orders	Back-logs
1943	53,806	32,094	.....
Jan.	4,949	2,788	18,739
Feb.	4,953	2,551	16,535
Mar.	5,863	2,913	14,899
Apr.	5,365	2,676	12,904
May	4,718	1,774	10,515
June	4,825	2,319	9,017
July	4,017	2,405	8,345
Aug.	3,513	1,989	7,429
Sept.	3,881	2,070	6,930
Oct.	3,792	3,401	7,092
Nov.	3,563	3,422	7,076
Dec.	3,217	3,786	7,731
1944	41,914	44,903	.....
Jan.	3,336	3,515	7,910
Feb.	3,426	4,338	8,822
Mar.	3,679	4,370	9,513
Apr.	3,496	2,424	8,441
May	3,547	4,089	8,983
June	3,554	3,906	9,335
July	3,027	3,086	9,394
Aug.	3,818	4,115	9,691
Sept.	3,445	3,465	9,711
Oct.	3,758	4,293	10,246
Nov.	3,451	3,401	10,196
Dec.	3,377	3,912	10,731
1945			
Jan.	3,355	3,631	11,007
Feb.	3,548	4,140	11,599

Magnesium Casting Shipments

(In thousands of pounds)

	Total	Sand	Perm. Mold	Die
1943	65,967	59,123	3,978	2,866
Jan.	4,376	3,934	253	189
Feb.	4,445	3,931	299	215
Mar.	5,364	4,802	300	262
Apr.	5,237	4,694	284	259
May	5,263	4,652	343	268
June	4,690	4,159	296	235
July	4,940	4,406	290	244
Aug.	5,238	4,770	257	211
Sept.	6,008	5,391	390	227
Oct.	6,774	6,096	431	247
Nov.	6,792	6,068	452	272
Dec.	6,840	6,220	382	238
1944	83,979	75,221	6,396	2,362
Jan.	6,984	6,210	536	238
Feb.	7,293	6,603	469	221
Mar.	8,242	7,574	496	172
Apr.	7,520	6,922	413	185
May	7,357	6,664	514	179
June	6,535	5,729	598	208
July	6,481	5,653	656	172
Aug.	6,934	6,143	563	228
Sept.	6,915	6,147	606	192
Oct.	6,738	6,062	515	161
Nov.	6,639	5,919	521	199
Dec.	6,315	5,595	509	207
1945				
Jan.	7,005	6,149	609	247
Feb.	6,707	5,832	658	217

GRAY IRON CASTINGS—Production, Shipments and Unfilled Orders

Monthly Totals

1944	(Tons) Production	Shipments	Unfilled Unfilled Orders
Jan.	793,884	765,423	2,259,158
Feb.	772,764	764,369	2,145,027
March	840,890	828,648	2,184,268
April	765,784	757,880	2,159,280
May	789,007	790,674	2,204,572
June	765,581	763,459	2,213,183
July	698,418	689,744	2,313,645
Aug.	778,388	778,205	2,335,194
Sept.	768,661	744,954	2,304,323
Oct.	788,196	780,453	2,296,690
Nov.	769,734	760,383	2,300,350
Dec.	743,710	741,534	2,474,548
Totals	9,275,017	9,165,726	.....
1945			
Jan.	807,130	791,395	2,496,928
Feb.	752,935	752,266	2,562,076

By Type—Latest Months Reported

	Production	Shipments Total	Shipments For Sale	Unfilled Orders Total	Unfilled Orders For Sale	Unfilled Orders For Own Use
February, 1945						
Total	752,935	752,266	464,858	2,562,076	1,804,207	757,869
Cast iron pressure pipe	43,595	40,039	37,542	153,629	148,336	5,293
Cast iron soil pipe	15,254	15,816	15,816	121,287	121,287	.....
Chilled car wheels	74,211	84,121	77,257	232,594	212,793	19,801
Molds for steel ingots	161,675	161,127	75,263	357,269	221,085	136,184
All other gray iron	458,200	451,163	258,980	1,697,297	1,100,706	596,591
January, 1945						
Total	807,130	791,395	485,027	2,496,928	1,728,034	768,894
Cast iron pressure pipe	48,389	42,320	39,413	137,516	132,421	5,095
Cast iron soil pipe	16,306	16,147	16,147	105,193	105,193	.....
Chilled car wheels	80,403	80,767	72,728	224,693	207,858	16,835
Molds for steel ingots	177,727	173,758	80,251	355,875	219,916	135,959
All other gray iron	484,305	478,403	276,488	1,673,651	1,062,646	611,005

WPB figures reported by Bureau of the Census

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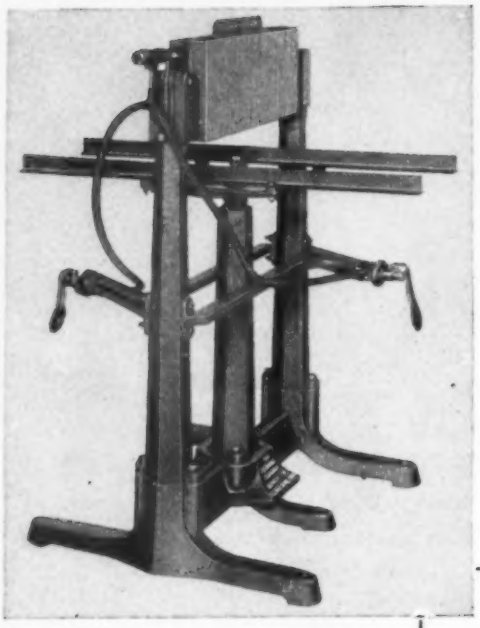

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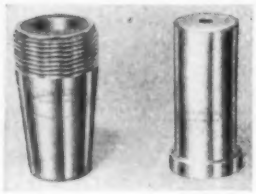

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The ideal machine for drawing more cores and better cores than you've ever had before. The separate center stand which supports the core tray is not affected by vibration of the drawing head. Core makers draw successive cores on same core tray without shaking down cores already drawn.

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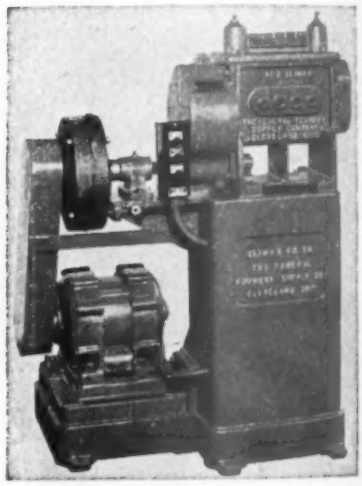
Any foundry, large or small, can cut production costs by straightening and re-using core wires and rods. With a Climax Wire Straightener this can be done quickly, economically, safely—by unskilled labor. A complete descriptive circular is yours for the asking.



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The best insurance you can buy against damaged patterns, core boxes or flasks. The pear-shaped grip is ideal for ramming.

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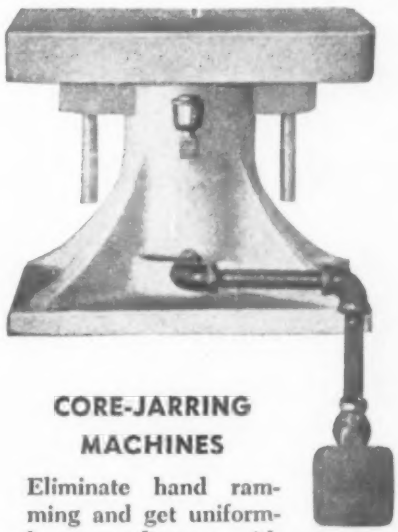

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Eliminate hand ramming and get uniformly rammed cores with Federal Core Jarring Machines. Powered by air, these machines are sturdy and long wearing. Readily available now when you need them. The present lack of experienced labor will not handicap your shop if you have Federal Core Jarring Machines.

THE LOWE ELECTRIC SIFTER

Faster sifting, better sand conditioning combine to cut costs when a Lowe is on the job. Malleable yoke creates faster sifting; more shovel clearance permits faster loading. Enclosed ball bearing motor is a miser on current. Instantly replaceable screen bottoms. Lowe-sifted sand is better sand. The Lowe's 21-inch diameter screen bottom gives you over 10% more screening surface than the conventional 20-inch screen!

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Users say it's worth its weight in gold. Small enough to be mounted on any bench or table, the Wonder Cutter will cut round or square rods and band iron. Priced at $39.50 f. o. b. Cleveland — every foundry should own one.

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GRAY IRON FOR POWER PLANT EQUIPMENT

(*Continued from page* 98)

belt conveyors for distributing sand from the mixing station to the various floors; installation of dust collection and other equipment in the cleaning room.

Although the company specializes in its contributions to the general field of industry, the foundry to all intents and purposes is a general jobbing shop. Long running jobs are the exception rather than the rule. This condition is reflected in a large and well equipped pattern shop located in a separate building several hundred yards away from the foundry where a staff of skilled patternmakers constantly is engaged in the construction of new patterns, or in repairing and making changes in existing patterns. Patterns temporarily out of commission are stored in numbered racks and aisles on the upper floors. Pattern lumber, a relatively precious commodity under present conditions, is stored in a section of the building adjoining the pattern shop.

Several factors are taken into consideration in deciding whether to make the mold for any given casting in a flask or in one of the pits in the floor. Principal factors include: 1—Size and shape of the casting. 2—Pattern equipment. 3—Available flask equipment at the time it is required. 4—Relative merits of bedding in or rolling over. 5—Number of castings required on any given order.

Usually where the casting does not occupy nearly all the space in a pit, a great deal more sand has to be rammed than where the casting is molded in a fairly close fitting flask. If only one casting is to be made, the extra cost of ramming the additional amount of sand is not as great as the cost of a new and special flask. Rolling over the drag of a large mold introduces certain hazards of strains and warpage that are not present where the pattern is placed on a solid foundation and the remainder of the mold built up firmly.

In this connection it is interesting to note that the technique for rolling drags over in this foundry prevents the body of sand in the flask from sagging while the mold is at the peak of the rollover arc. The method also eliminates the strain incident to applying all the lifting force to one of the side members of the flask. The inevitable spring in the center of a long side member, with consequent lack of contact with the sand on the inside, also is prevented. Instead of hooking a two-way chain to the flask handles, a long two-way chain is wrapped completely around the drag with the hooks engaging at one side. When the crane pulls up on the load the chain holds the flask in a tight grip.

Describes Pattern Equipment

A typical example of pit molding practice is shown in Fig. 2. The casting from this mold is shown in Fig. 1. The young man in the center who kindly posed as a unit of measurement is not a giant, but on the other hand he is not a midget nor a member of the industrial and abbreviated company of Seven who staunchly supported Snow White and whistled while they worked.

Pattern equipment included a half pattern for forming the lower half of the mold and a number of coreboxes for forming the remaining or upper half, also the openings in the two branches. A layer of sand rammed on top of a coke bed was scraped off level to form a seat for the large central core print and at the proper height to bring the central or joint line of the pattern flush with the surrounding foundry floor. The pattern was lowered onto the prepared sand bed. A pair of long parallel straightedges and a level were employed to check the upper face of the pattern and bring it into a true level and horizontal plane. Minor adjustments were made by wedges on top of temporary piers under the outer edges of the pattern. Long weights then were placed on the pattern to hold it in position while sand was rammed all around it in the space between pattern and pit wall and up to the normal floor level.

Small, narrow gates formed in dry

(*Concluded on page* 218)

FORCED PRODUCTION

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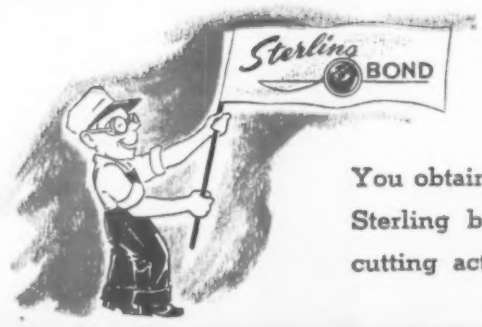

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THE WHEELS OF INDUSTRY

(*Concluded from page 216*)

sand cores were set in place at several points around the pattern to facilitate the rapid and uniform distribution of the molten metal. These gates were connected to upright sprues that later were extended to the pouring basin on top of the mold. The gate openings in the face of the mold and the sprue openings on the joint line are clearly shown in the illustration.

When the sand in the pit was rammed almost to the floor level, a row of cast iron curbing was set up about 12 inches back and around the pattern to serve as reinforcement at the joint line and as a foundation for several other tiers of similar curbing extending upward to the finished top of the mold. Each curb section is a cast iron plate 12 x 12 inches with a male joint member at one end and a female joint member at the opposite end. The device readily may be assembled to enclose practically any shape or size mold, and may be taken apart just as readily in the process of stripping the mold away from the casting.

While the mold was under construction in the foundry floor, the core room department prepared the sectional dry sand cores to form the inside and the upper half of the mold. After the mold face was dried to a depth of 3 or 4 inches, the cores were lowered into place in the various reinforced core prints provided for that purpose. Vents were connected with passages leading to the outer atmosphere and double end chaplets were inserted at strategic points to prevent the cores from shifting position when the mold was filled with iron.

The mold was bound together with long steel beams anchored at each end to hook bolts extending to similar binders in the bottom of the pit. As an added feature a number of cast iron weights were piled on the binder beams to resist the tremendous pressure exerted by a large body of molten metal under a high head.

With floor space at a premium, with frequent changes in size and shape of jobs going through the shop, and with the commendable desire to maintain as neat and orderly a condition as possible, the only flasks in the shop are those in active use. All others out of commission for short or long periods are kept in the yard outside the north side of the building. Out-going flasks are loaded on a buggy mounted on a narrow gage track extending at one end into the main bay of the foundry, and to a point in the yard at the other end where the flasks are lifted by a crane and stacked in orderly piles. The process, of course, is reversed where empty flasks from the piles are brought back into the foundry.

Cleaning the Castings

The cleaning room occupies space at the east end and the full width of the foundry from which it is separated by a partition wall. Castings from the shakeout are loaded on a buggy and enter through a large doorway in the center of the wall. The loads are divided roughly into two classifications, those that can be manipulated by hand, and those which require the service of a crane. The light castings are spread out on the floor for chipping and grinding in one section of the building, while the large, heavy castings are worked over in a shallow pit gradually worn in the floor over a period of many years. Many of the small castings are cleaned in tumbling barrels. Large castings are loaded on a car and taken into a chamber where the surfaces are pressure blasted with abrasive material. At regular intervals the accumulation of core sand and coke removed from the castings is collected and trucked to the dumping ground.

Erected parallel to each other on a sloping terrain, the floor of the foundry and the cleaning room is approximately 10 feet higher than the floor of the machine shop receiving room. For that reason the floor of the cleaning room at the north end terminates in a concrete wall which extends downward to a concrete extension to the receiving room floor. Castings picked up by the cleaning room crane are lowered into this rectangular opening, or jog, between the floor levels and loaded on a transfer car which hauls them into the machine shop. A stairway near one end of the chamber is provided for the benefit of employes whose duties carry them from one floor level to the other.

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IMPORTANT NEWS

Gamlen Chemical Co. Purchases Patents and Products of Quandt Chemical Co.

San Francisco, Calif.—The Gamlen Chemical Company has purchased important patents and products of Quandt Chemical Company, well-known maker of foundry supply products since 1885.

Foremost among patents purchased by Gamlen is one covering manufacture of Quandt Core Oil, a unique binder perfected by Quandt after more than twelve years research. This product is known as the "universal" core oil, because it is applicable to all metals.

Another well-known product transferred to Gamlen is Quandt Core and Mold Wash, which is made in various grades for steel, iron, and non-ferrous foundry work. These quality products are additions to an impressive list of industrial chemicals produced by the Gamlen Chemical Co., and it is said in the field that this rapidly-growing firm is destined to

NOW MADE AND SOLD BY

Quandt Core Oil is a unique binder that can help you get consistently high-grade castings at less cost. Its use cuts baking time and fuel cost, enables safe utilization of finest grain sand, makes a very strong core that is amazingly easy to rap out, and assures sound true castings of uniformly excellent finish. *Descriptive Bulletin 453 on Quandt Core Oil and Quandt Core and Mold Wash will be sent upon request.*

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Representatives in all principal cities

ALUMINUM FOUNDRY PRACTICE

(*Continued from page* 91)

2. Increased reaction of the molten metal with the mold results.

3. Higher oxidation losses result, and the tendency of the aluminum to absorb excessive quantities of other elements, such as iron, is greatly increased.

4. Susceptibility of the metal to dissolve gases, such as hydrogen, is substantially increased. For example, seven times as much hydrogen will dissolve in aluminum at 1600 degrees Fahr. as at 1280 degrees Fahr.

5. The higher the temperature to which aluminum has been heated, the larger the grain or crystal size of the resultant casting.

While the result is influenced by the length of time at which the metal is held at the high temperatures, merely bringing the metal to the higher temperature and cooling immediately may cause inferior properties in the castings. Therefore, the effect is in a measure independent of the actual pouring temperature. Large grain size is in general associated with low mechanical properties. Furthermore, when castings are to be heat treated, the smaller the grain the better the effect of the heat treatment. Consequently, overheating the metal is detrimental to producing the best physical properties in castings. Choice of the proper melting and pouring temperature for any particular casting is largely a matter of experience as to what temperature will be necessary to run the casting. However, whenever possible, it is desirable to gate the castings so they can be run at temperatures below 1300 degrees Fahr.

Nonmetallic inclusions, such as oxides, nitrides, carbides, etc., and hard spots are other defects found in aluminum castings which are generally the result of improper melting conditions. As a means of clarification, oxides, nitrides, carbides, etc., will be designated as nonmetallic inclusions and hard spots as metallic inclusions in castings.

Nonmetallic inclusions often develop as a result of excessively fast melting rates which do not permit sufficient time for the oxides, etc., to rise to the surface of the melt. Unlike most of the other metallic oxides, aluminum oxide has relatively the same density as the metal and, consequently, its separation from the metal is more difficult. Proper fluxing and holding the melt for 20 to 30 minutes after the metal is completely molten before pouring is advisable, to separate the oxides from the metal effectively.

Hard Spots Develop

Hard spots are usually revealed in machining castings in the form of hard black and dark purple constituents. For example, in one instance where the die cast aluminum couplings were being threaded, it was necessary to regrind the threading dies after finishing only 25 to 50 of the couplings, due to the presence of these hard spots. However, after the hard spots were eliminated from the metal, between 1500 and 2500 couplings were machined consistently with the same threading tool. We have analyzed some of these hard particles and found them to contain as high as 30 per cent iron, 25 per cent silicon and 8 per cent manganese. These hard spots have been found to develop as a result of the following conditions:

1. Precipitation of primary constituents when aluminum containing high percentages of iron is cooled down from high temperatures.

2. Localized hot spots, usually on the bottom of the melting pots, cause the solution of appreciable quantities of iron which precipitates along with silicon and manganese as it diffuses into colder portions of the melt.

3. In aluminum die cast holding pots, which generally operate at relatively low temperatures, the addition of ingot to replace metal which has been ladled out often chills the bath to the extent that iron, silicon and manganese solid constituents separate out and become

(*Continued on page* 222)

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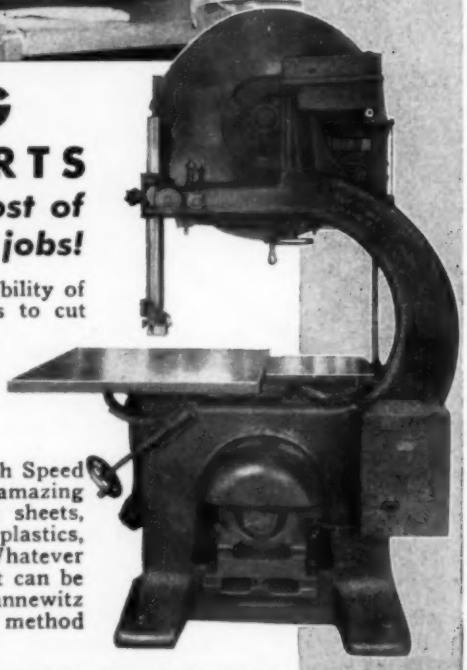
and performing a host of other metal cutting jobs!



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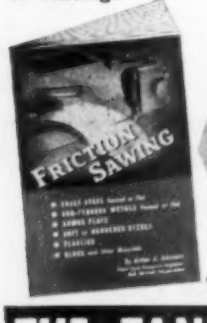

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the perfect material for

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This South Dakota gannister makes a smooth, hard, non-spalling surface which resists high temperatures and abrasion and gives maximum lining life. It is furnished in a variety of sizes to meet the requirements of the most exacting foundryman.

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Molding Sands
Fire Brick
Fire Clay
Bonding Clay
Gannister
Firestone
Limestone
Silica Flour
Western Bentonite
Southern Bentonite
Steel Shot and Grit
Blast Nozzles
Foundry Coke

NFS

NATIONAL FOUNDRY SAND CO.

2970 West Grand Blvd., Detroit, 2, Mich.

(*Continued from page 220*)

suspended in the metal.

4. Composition of the sludge or dross, which sometimes deposits from aluminum melts on the bottom and side walls of melting pots, frequently is similar in composition to the hard spots; consequently, when the melt is stirred without the use of flux, this sludgy material is broken up and disseminated in the melt with the resulting hard spots in the castings.

It is quite apparent, therefore, that to avoid hard spots in castings, the following precautions are necessary: Avoidance of high iron pickup in melting; uniformly distributed heating of the melting pots; making additions of molten metal rather than ingot to die casting holding pots; and drying up the wet, sludgy melting drosses with flux rather than stirring them into the metal.

Melting aluminum ingot and, in particular, melting gates and risers always generates a certain amount of dross. This dross in its normal state is of a sludgy character and it is difficult, if not impossible, to effect a clean separation of it from the melt without the use of flux. There are a large variety of fluxes available. Many are hydroscopic and generate excessive smoke and obnoxious fumes, or introduce undesirable impurities into the aluminum, such as do the zinc and manganese chloride fluxes. An excellent all-round foundry flux is a fifty-fifty mixture of sodium fluoride and potassium chloride. This flux is effective in drying up aluminum drosses without excessive fumes and it does not readily absorb moisture from the air. When this flux is used for refining high silicon alloys, it acts as a modifier for the silicon and thus improves the physical properties of the casting. Furthermore, this flux is used to particularly good advantage in melting aluminum-magnesium alloys in which the drosses are very sludgy and difficult to dry up. The sodium fluoride and potassium chloride flux will not only dry up the aluminum-magnesium alloy drosses satisfactorily, but unlike most fluxes, it does not remove excessive amounts of magnesium.

With further reference to the aluminum-magnesium alloys, there has been a decided increase in the use of these alloys because of their remarkable physical properties and corrosion resistance. These alloys dross heavily, due to the chemically active magnesium constituent, and it has been found desirable, when the magnesium is in excess of 1 per cent, to sprinkle flux on the ingots while melting and to maintain a thin film of flux on the bath during pouring operations. A good protective flux for this purpose consists of 40 per cent sodium chloride, 50 per cent potassium chloride and 10 per cent anhydrous magnesium chloride. This flux acts to inhibit the oxidation of the magnesium, has an exceptionally low melting point and specific gravity, and it is very fluid, such that only a very small quantity is required to cover the surface of the melt completely.

Eliminating Porosity

One of the most common and troublesome defects in aluminum castings is porosity. The deleterious effects of porosity on the physical properties and pressure tightness of the castings is well known and, consequently, there has been a concentrated effort on the part of both foundrymen and the ingot producer to eliminate it. Generally speaking, there are two kinds of porosity—namely, gas porosity and shrinkage—and the two types are often associated in a casting. Gas porosity results when gases, principally hydrogen, which have been absorbed by the metal in its molten state, are released as the metal freezes. Such conditions as high temperature melting, the introduction of wet or oily scrap, gates, risers, etc., the impingement of the direct flame on the molten metal and excessive turbulence in handling the molten metal, are known to promote the absorption of hydrogen by the aluminum.

In most foundries a proportionate quantity of gates and risers are melted with the ingot, and occasionally a high temperature heat occurs so that a short degassing treatment is advisable, particularly when high strength or pressure tight castings are desired. Nitrogen

(*Continued on page 224*)

SCHUNDLER
BENTONITE

- A laboratory controlled, first quality product especially "tailored" for Foundry Use
- Offered by a pioneer producer
- Sold with a complete technical service . . . available on request . . . fitted to your individual needs
- Stocks located in principal cities

F. E. SCHUNDLER & CO., INC.
520 RAILROAD STREET • JOLIET, ILLINOIS
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What ROSS Has Done For Aluminum and Magnesium

Reproduced from advertisements featuring ROSS advanced oven designs for Aluminum and Magnesium foundries.

can be done to benefit the

GRAY IRON FOUNDRY

Solving the new production problems presented by the introduction of light weight metals has resulted in major advances in former methods for baking and treating that are proving profitable for the Gray Iron foundries as well.

Recent ROSS developments in zone heating, control and uniformity of temperatures, and air distribution, have made possible new standards of capacity, quality and quantity of output that will prove highly advantageous in the production of gray iron castings.

New improved design, construction and operating features are available in ROSS Ovens of continuous, compartment or stationary types — for every step in processing from the core to the finished casting. Consider them in your plans for post-war production.

Consult Us On Your Foundry Ventilation Problems.

Proper foundry ventilation need no longer prove a problem in maintaining working comfort and efficiency. ROSS engineers, with a background of 25 years experience in this field, will gladly explain the most modern methods for providing ideal conditions.

ROSS SYSTEMS

J.O.ROSS ENGINEERING CORP.

DESIGNERS AND BUILDERS OF AIR PROCESSING SYSTEMS

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CARRIER — ROSS ENGINEERING COMPANY, LIMITED, LONDON, ENGLAND

ROSS CONTROL OF AIR FOR MODERN INDUSTRY SYSTEMS

(*Continued from page 222*)

generally is accepted as being the most suitable degassing agent for ordinary foundry operations. In the degassing treatment approximately 3 cubic feet of compressed, oil-pumped nitrogen per 100 pounds of molten aluminum is bubbled gently through the metal over a period of 10 to 20 minutes.

A heavy wall graphite tube with approximately ½ inch inside diameter, suitably connected to a nitrogen tank with the necessary fittings and a rubber hose, is satisfactory for injecting the gas into the metal. The end of the tube is plugged and a section approximately 2 inches from the bottom is perforated with 20 to 25 uniformly spaced ⅛-inch diameter holes. The nitrogen is turned on before the tube is lowered to the bottom of the melting pot and the tube frequently is moved about by the operator to aid in dispersing the gas throughout the metal. The degassing treatment on aluminum is most effective at comparatively low temperatures, such as 1250 degrees Fahr., because the solubility of hydrogen in the metal is relatively low at such temperatures.

As previously stated, there is another common form of porosity known as shrinkage porosity, which is not due to gas in the metal. In aluminum ingot, particularly in the high silicon alloys, this shrinkage porosity usually occurs as segregated, spongy areas just under the external pipe of the ingot. This shrinkage porosity in the ingot is not harmful since it is eliminated completely on remelting, whereas the gas or pinhole type of porosity in the ingot is very frequently not eliminated by remelting. In castings which are not fed properly, especially in the heavy sections, these spongy shrink areas may also occur, but in such instances they usually are detected readily and eliminated by increasing the capacity of the risers. In other instances, however, the shrinkage porosity may follow the grain boundaries of the metal in a form that is not readily detected by the naked eye.

In castings designed for pressure tightness, the grain boundary shrink porosity often causes a high percentage of "leakers." In such castings a section ¼-inch thick taken from the area which leaks, carefully machined on both sides and x-rayed, will expose the shrinkage porosity. The shrink porosity also can be detected by microexamination of fractured sections of the castings. The simplest means of correcting this shrinkage condition in the metal grain boundaries is to increase the height of the risers for the casting.

Use Frequent Check

The deleterious effects of gas porosity and large grain size on the physical properties and pressure tightness of aluminum castings has been discussed. It is advisable to check castings for these conditions occasionally, and such a check can be made by a simple macro-etching operation. A heavy section of a casting, preferably from an economic standpoint a section cut off in finishing the casting, is sawed and faced off smoothly with a lathe or file. The machined face then is dipped into approximately 50 per cent sodium hydroxide solution for a few minutes, washed with water and then dipped into an approximately 50 per cent nitric solution. Several repetitions of this procedure will expose any visible porosity as well as the grain structure of the metal.

The presence of pin hole porosity would indicate the necessity of a degassing treatment on the metal being poured and large grain size in a relatively heavy section of the casting (i.e., greater than 0.50 millimeter) would show the need for additional grain refiner. Many producers of ingot make the addition of titanium or boron so that the foundryman will obtain fine grained castings. However, if large quantities of gates and risers are melted with the ingot, or the metal is heated for long periods, the effect of the grain refiner is dissipated largely.

Usually the further addition of 0.05 per cent titanium in the form of an aluminum-titanium hardener containing 5 per cent or less titanium, or the addition of 0.005 per cent in the form of an aluminum alloy containing 2 per cent or less boron to the melting pot just before pouring, will produce satisfactory

(*Concluded on page 226*)

WOODISON'S

6

QUALITY PRODUCTS AID CASTING PRODUCTION

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CORE OIL

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PARTING

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CORE PASTE

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CORE WASH

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CORE COMPOUND

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SEA COAL

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It's here!

THE VIBROLATOR

A VIBRATOR THAT ELIMINATES CASTING DISTORTION BY . . .

Why the VIBROLATOR is better

- **Adjustable Vibration Control**
- **Needs No Lubrication**
- **Will Not Jam**
- **Produces Perfect Molds**
- **Operates on a Wide Range of Air Pressure**
- **Economical Operation**
- **Light in Weight**
- **Quiet Operation**
- **Powerful Vibration**
- **No Wearing Parts**

PULSATING IN 4 DIRECTIONS . . . NOT TWO!

The greatest bugaboo of foundry vibrators — distorted and egg-shaped castings — has finally been overcome with the new VIBROLATOR. Because its action is circular, imparting an even amount of clearance to all of the mold walls when attached to a pattern, casting distortion from this source is entirely eliminated.

NOTHING TO GET OUT OF ORDER

Because of its simple and scientific design, the VIBROLATOR will give years of troublefree performance. It will boost production and greatly reduce scrap — respond to a touch of the knee valve — withstand the hardest abuse!

COMPLETE FACTS—IMMEDIATE DELIVERY

It will pay you to get complete facts on the VIBROLATOR. Better still, write your order now. The VIBROLATOR is unconditionally guaranteed to meet your every requirement! Order at once for prompt shipment and extend priority rating.

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KEWANEE, ILLINOIS

SIZES FOR ALL REQUIREMENTS

Size	Weight	Price
3/8"	5 oz.	$ 9.50
1/2"	7 oz.	11.75
5/8"	9 oz.	13.50
3/4"	12 oz.	15.00
7/8"	16 oz.	16.50
1"	24 oz.	18.00

MARTIN ENGINEERING COMPANY
Kewanee, Illinois

Please send me specification sheets for the Peterson VIBROLATOR.

Name_____

Company_____

Address_____

City_____ State_____

(*Concluded from page 224*)

grain refinement in the castings. The stated use of titanium and boron for grain refinement applies principally to aluminum sand and permanent mold castings, since the rapid chilling effected by die casting is generally sufficient to inhibit the growth of large crystals in the metal.

Magnesium Products Described

An educational program describing magnesium products has been made available to executives and engineering groups by the Hills-McCanna Co., 3025 North Western avenue, Chicago. The program consists of a sound film depicting the production and fabrication of magnesium, particular emphasis being placed on foundry operations, and a display of various magnesium products, produced from sheet, rod, tube, extrusions, forgings and castings. As souvenirs the company distributes magnesium discs and a booklet entitled "A Tour of a Modern Magnesium Foundry". A duplicate film will be available for any company wishing to have a private showing, and also for colleges and universities.

Finding the CAUSE—
suggesting the CURE
for DEFECTIVE CASTINGS
...ours is the business of helping YOU

KAWIN SERVICE includes advisory and consulting assistance on every phase of general foundry practice. We invite your inquiries.

LABORATORY SERVICE

Our laboratories offer you prompt and accurate service on chemical and physical testing of all ferrous and non-ferrous metals, sand, coal, coke, fluxes, etc.

SERVICE TO FOUNDRYMEN SINCE 1903

KAWIN

Chemists FOUNDRY ENGINEERS *Metallurgists*
431 So. Dearborn St.
CHICAGO (5), ILL.
BUFFALO LABORATORIES—110 PEARL STREET

GRAY IRON, ITS PRESENT AND FUTURE

(*Continued from page 99*)

composed of in America?

We found out long ago that our industry was unknown to the public, and early in the autumn of 1941 we made a frantic effort to publicize it to Washington officials at least by means of three leaflets mailed at intervals to every man, woman and child in the OPA and WPB. All we knew about publicity was advertising. But the puny effort failed, because all mail is opened and if the addressee's name is not inside, there is nothing to identify the enclosure.

We lacked money for an advertising campaign, so a committee was appointed to see how much could be raised by voluntary subscription. Through the almost superhuman efforts of the chairman of that committee, E. C. Hoenicke, Eaton Mfg. Co., Detroit, slightly over $31,000 was obtained or pledged and a professional publicity expert employed. Think of it! An industry with annual sales amounting to over a billion and a half dollars was agreeable to risking only that puny amount to save itself.

Our man's practiced eye quickly sized up the situation. If we went in for advertising, we could use up the entire fund in three weekly issues of the *Saturday Evening Post*. If we stuck to trade journals, we could reach only a small fraction of the public composed of men and women who, if anyone knew anything about us, they did.

Reached Through the Press

But the people who composed the war agencies—from local draft boards to the big shots in the WPB, OPA, WLB and all the others—were the American public. They were professors, lawyers, salesmen for every kind of product, the butcher, baker and candlestick maker. They, not the manufacturer, held our destinies in their hands. Besides, if we tried to advertise our product, our field of coverage and spread of quality and size is so great that no one would know where to begin.

The answer was obvious. We must reach these people through the medium they read, which is manifestly the daily press and the periodical.

A trained newspaper man, John P. Mullen, determined that so vast an industry and so important a one which was virtually unknown could readily become news, so news we became—slowly at first, but with ever increasing momentum. Releases went out to every part of the country by the score. Anything, where the foundryman had a fire or a baby, if the words "engineering gray iron" could be tacked on to it, the word went out.

During the year and a half the society's educational campaign has been

(*Continued on page 228*)

17 DIFFERENT FOUNDRY UNITS

Served by KIRK AND BLUM

VERSATILE DUST CONTROL APPLICATIONS

Controlling the dust in seventeen different foundry units called for a highly specialized system. Kirk & Blum Engineers solved this problem with a three-way system utilizing Rotoclones, Cloth Filters and Centrifugal Type Collectors.

In the foundry proper, which includes all types of sand-handling equipment, Roto Clones did the job while cloth-type filters were used in the cleaning buildings. In the pattern shop a centrifugal type collector and storage bin was installed for shavings and dust collection.

Another problem presented itself and was overcome. Because of crane interference, all discharge pipes had to pass vertically along column centers with special transitional shapes.

If you want top efficiency and economical operation in dust control for your foundry, get the unbiased facts and expert counsel of Kirk & Blum Engineers. For further information write to

The KIRK & BLUM Mfg. Co.
2808 SPRING GROVE Ave. CINCINNATI 25, OHIO

KIRK AND BLUM

(*Continued from page 226*)

going on, we have spent just a little more than half of our fund. During this time, had we paid for our publicity at the lowest newspaper rate—that of classified advertising—we would have expended more than $250,000.

The effect has been nothing short of a miracle. Instead of waiting hours to gain entrance to offices, our council is sought by telephone and visit. We hear from people we never heard of before and we are definitely on the map.

I cannot let this opportunity slip to put in a plug for costing. When the OPA first started its regulation of our prices they gave us the astounding information that only about 25 per cent of the gray iron foundries had any cost system—good, bad or indifferent. We knew the situation was bad, but not that bad, so we are making every effort to improve it, but attacking this huge industry with but two cost men is a big order.

It should be manifest to everyone in business that without sound costing, a foundry cannot have sound pricing; and without sound pricing, how can it have conditions of equipment and housekeeping that will attract the class of labor required to deliver the best product at a fair price? Without sound costing, how can the industry develop and foster research necessary to maintain progress, to say nothing of profits? Everything in the future depends upon sound costing if we are to survive. It will take money to do the necessary job of cleaning up, and money does not come from hidden deficits.

While we are on the subject of profits, there are several things that mystify me in connection with the OPA. The Gray Iron Foundry Industry Advisory Committee to the OPA has been most active in bringing to that bureau the industry's viewpoint on price control as applied under our maximum price regulation. The OPA states that the sample they were able to take of the industry's financial history during the base period selected showed an average of 4 per cent profit before taxes. We have every reason to believe that the OPA is telling the truth, but while I have never run a foundry, the figure of 4 per cent before taxes certainly looks to me as though the industry was liquidating itself during that era, or else that successful and well-run foundries had refrained from submitting their figures.

While our committee complains that relief up to the point of 4 per cent, or where the overall of the company is larger, to manufacturing cost, is insufficient and unsound economically, the OPA points to the very small number of plants that have appealed for relief and the great number who are not taking advantage of the short order clause nor charging overtime as permitted now.

Demands Have Increased

Today is the greatest seller's market our industry has ever seen. Unfilled orders in December had mounted from 2,145,027 tons the preceding February to 2,474,548. That was not altogether due to manpower shortage and inefficiency, because new orders had risen from 517,466 tons in January, 1944, to 885,748 in December, thus presenting a clear picture of increased demand.

Everyone knows that many of our materials and supplies have risen in cost without compensating change in the price ceiling. Labor costs have risen and efficiency has fallen. With all these cumulative rises in cost, why, then, the reluctance to take advantage of such crumbs as the OPA offers us? Some have told me that the government takes away profits, so why not maintain the good will of old customers? It would seem to me that the good will of 4 per cent before taxes customers was hardly worth the having and that now is the time to accustom your market to prices that undoubtedly will be forced to rise, if we are to get our house in order after the war.

The pounding we have taken in the public press from the "Hot, heavy, dirty etc." slogan will take long to overcome when we have the manpower to make improvements. We must tell the world that the foundry is a good place to work and then see to it that it is.

We believe that everyone but the OPA agrees that the operation of our price order has actually raised prices

(*Continued on page 230*)

DAYTON
SNAGGING WHEELS

For fast snagging with minimum wheel wear or operator fatigue specify Daytons. Preferred by hundreds of steel and gray iron foundries from coast to coast for years.

SIZE, SHAPE, GRAIN AND GRADE REQUIRED. WRITE, PHONE OR WIRE.

SIMONDS WORDEN WHITE CO.

710 NEGLEY PLACE, DAYTON 7, OHIO

NOW... cleaner, stronger mold surfaces in two quick easy steps...

WITH NEW TRULINE MOLD SPRAY 91

Now, the makers of Truline Binder* bring you another low cost aid for the production of better steel, iron and non-ferrous castings . . . *Truline Mold Spray 91.* Just spray or brush on green sand molds, ignite and burn it off. Result: a uniformly hard, dry, resin-coated surface which is cleaner, stronger . . . produces cleaner, smoother castings. Time required: only a few minutes from start to finish. Cost: a few cents per mold.

This new Hercules development saves valuable time over old-style torch drying, is more dependable. It eliminates loose sand particles, increases resistance to the washing action of metal entering the mold, minimizes work entailed in getting castings ready for shipment.

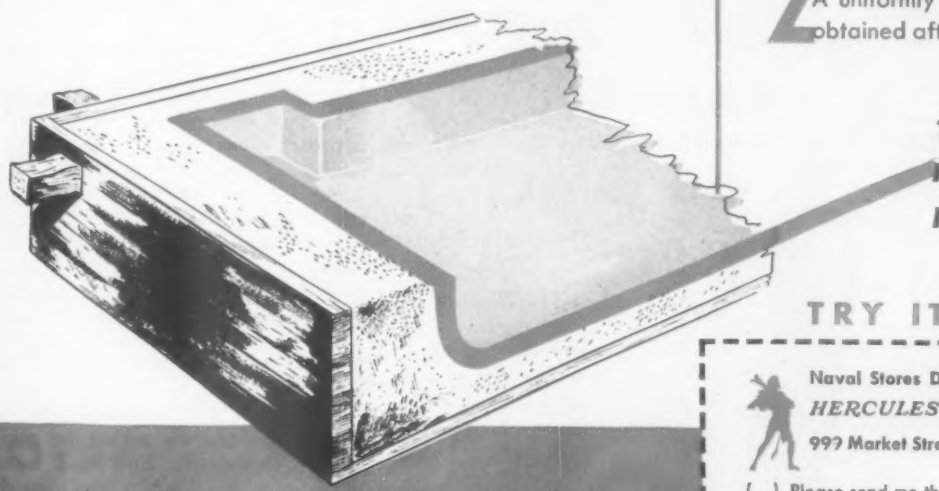
Truline Mold Spray 91 comes ready for use, can be applied on natural or synthetic bonded molding sands. Try it out without charge by returning the coupon.

1 SPRAY IT ON...

The green sand mold surface is covered with enough Truline Mold Spray so that it will burn freely when ignited.

2 BURN IT OFF...

A uniformly strong, dry mold surface is obtained after the solvent has burned off.



THE HARD RESIN FILM KEEPS MOLD SURFACE INTACT...

TRY IT TODAY!

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HERCULES POWDER COMPANY
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999 Market Street, Wilmington 99, Delaware

( ) Please send me the story on Truline Mold Spray.
( ) Please send sample.

Name.....

Company.....Title.....

Address.....

TRULINE *Mold Spray 91*

*Reg. U. S. Pat. Off. by Hercules Powder Co.

HB-52

(*Continued from page* 228)

rather than kept them down. A foundry which is unable to handle an old base period pattern at a profit is hardly to be blamed if it gets rid of it and replaces it with a new one for which he can charge a formula price. This has naturally operated to throw a lot of know-how out of the window and actually cost the customer a higher price than a reasonable advance to the foundry accustomed to the work would have had to charge to make it attractive.

This migration of patterns has caused considerable changes in the foundry and its customers. Many new relationships have been established which may prove extremely advantageous to the foundry in the future, so this would appear to be a good time to determine what cats and dogs to get rid of.

We readily admit that our foundries are having tough sledding at present, and the causes that led up to this situation are easy to diagnose. Once we realize them, we can plan to correct them.

Now, I am neither a prophet nor the son of a prophet, but we have been making some studies of prospective markets that would indicate a rather cheery outlook for so basic an industry as ours.

The SEC recently issued a report on the liquid savings of the individual in the United States. This excluded institutional savings such as banks, life insurance companies, etc. It found that on Dec. 31, 1944, there were 53 billion dollars in government war bonds and 80 billions in savings deposits. This means 133 billions of pent-up buying power in the hands of our people.

Straws show how the wind blows. A few weeks ago, one of our staff saw a combination electric mixer and juicer advertised in a local department store. It was a Thursday and many Washington shops open at noon on that day. He happened to be near the store about 2 o'clock, so he dropped in to have a look at the contraption. Its advertised price was $18.75 which, after all, isn't hay. The store told him that a line started forming outside the shop at 9 that morning. All were sold 30 minutes after the shop opened. They listed the disappointed customers in their order on the line and promised to let them know if they received any more. They stated that the list had over 300 names on it, so it would hardly be worth while to add our friend's. That juicer had a gray iron base. Is it not reasonable to suppose that release of vacuum cleaners, washing machines, refrigerators and similar household appliances will be the signal for a similar wild scramble?

Take movie theaters for another example. We recently had some correspondence with one of the leading theater architects of the country who had surveyed that prospect. He told us that there would be an immediate demand for theater seats containing 17.7 pounds of castings per seat and aggregating 6800 tons.

Demand Fair Prices

The National Association of Domestic and Farm Pumping Equipment and Allied Products Manufacturers tell us that their immediate demand for gray iron will exceed by one-third that of any previous time and wants to know if the industry is prepared to handle it.

Automobile manufacturers estimate an immediate demand for from 8 to 12 million cars. The average car contains 512 pounds of gray iron. That spells from 2,048,000 to 3,072,000 tons of gray iron castings.

We find abroad that France has a gold credit of 4 billion dollars in America, South America has 2 billion. Scandinavia, the Netherlands, Spain—all Europe and Asia, in fact—will be looking to the United States for manufactured equipment.

Now, with such a prospect before us, what steps are we taking or going to take to meet it? First and foremost, every gray iron foundryman must determine to establish sound estimating and costing. We must encourage others to do so, because in that respect we *are* our brother's keeper. One rotten apple in a barrel can spoil the barrel, you know.

We must then make up our minds that we shall demand fair prices for our product and not let the purchasing agent run our business for us. If we were a 4 per cent industry before the war, we must

(*Continued on page* 232)

For
Sound Castings
SMOOTH and CLEAN
CAPEWELL CHILL NAILS
They are cold rolled from the finest soft iron. The Capewell line is the most complete — with nails for every purpose and every size of casting. Samples and prices promptly sent on request.
THE CAPEWELL MFG. COMPANY
Hartford, 2, Conn.
TECHNITE
CAPEWELL
HACK SAW BLADES
Cut Costs and Cut Time
The Capewell method of heat treating provides you hack saw blades that cut faster and last longer. Test them yourself, on your toughest job. Order from your mill supply man.
CAPEWELL
CHILL NAILS • HACK SAW BLADES

TO THE MARITIME INDUSTRY

FOR

Distinguished Service

The reply of American industry to the challenge of Brutalitarianism has been a deluge of production never before achieved by any nation in the history of mankind.

A significant share of the credit for this amazing record of accomplishment should be given to our Maritime Industry which, since Pearl Harbor, has produced a tonnage of vessels that will live forever as an epic of Yankee ingenuity. Federated is proud to salute every individual in the Maritime Industry for this magnificent job!

And proud, too, that since the start of the war, nearly two billion pounds of Federated non-ferrous metals have been supplied to the shipbuilding and other American industries to help speed the day of ultimate victory.

Federated

METALS DIVISION

FMD AMERICAN SMELTING & REFINING COMPANY

120 BROADWAY, NEW YORK 5, N. Y.

Nation-wide service with offices in principal cities

ONE OF A SERIES OF ADVERTISEMENTS DEDICATED TO THE PRODUCTIVE ROLE OF AMERICAN INDUSTRY IN WORLD WAR II.

(*Concluded from page* 230)

determine never again to lapse into that class. Did you ever hear of a foundry that went to the wall because it charged a profit?

Once these conditions are established, we must set up good housekeeping, good equipment and good working conditions, if we are to attract a class of labor that will give a fair day's work for a fair wage.

We must improve the quality of our supervision and management and must encourage education toward that end as well as research.

Our future lies in our own hands. Will we seize the opportunity?

LET'S HAVE MORE RESEARCH!

(*Continued from page* 103)

search involves expenditures, and a fair question concerns how much money should be allocated for that field. So far as is known there is no definite minimum or maximum value ascribed, but data gathered by the National Resources Planning Board indicate that the median expenditure by concerns supporting research is 2 per cent of the gross sales. In the aggregate it can amount to a considerable sum as may be seen by using as a base the available statistics and estimates on production figures pertaining to the foundry industry. In normal times the value of product made by the steel foundry industry is estimated at about $150,000,000; for the malleable castings industry the value is $96,500,000; for the gray iron foundry field the value is $890,000,000, and for the nonferrous foundries about $405,000,000. The grand total for the entire field is $1,541,500,000 for the value of product, or what may be termed gross sales. During the war, the estimated total approximated 3 billion dollars.

Two per cent of normal value of production is nearly $31,000,000—a sizeable sum which, spent for research, could do much in advancing the castings industry. For each branch of the industry the amounts would be $3,000,000 for steel castings, $1,930,000 for malleable castings, $17,800,000 for gray iron castings and $8,100,000 for nonferrous castings. Even if the percentage set aside were cut to 1 per cent a tidy sum would be available in each branch, as may be seen from the following: For steel castings $1,500,000, for malleable castings $965,000, for gray iron castings $8,900,000, and for nonferrous castings $4,050,000.

Foundry Research Lags

Why is it that with such possibilities for research funds, the many producers of castings have lagged in that field? While some may believe the industry is not research minded, the true answer probably can be found in the form or makeup of the foundry industry. Even the most casual consideration will indicate that the industry is composed of a large number of small foundries and a few large ones.

The small foundry justifiably will say—it's all very fine to talk about conducting research on the basis of 1 or 2 per cent of gross sales, but what kind of research can you do with $1000, $2000, or even $5000 a year? You cannot even buy any equipment, let alone get someone to do the work! That is true. But the logical solution will be found in the pooling of interests and the carrying on of the type of research that will be of mutual benefit.

How can this work be conducted? While many favor co-operative research with each member performing part of the work in his own plant, there are certain conditions in this particular instance which militate against such practice. Most important are lack of equipment and lack of trained personnel. Research requires careful planning if it is to be effective. Before embarking on any program it is advisable to make a search of the literature, often termed "paper research" or deskwork, to prevent duplicating work already performed. Such work requires good library facilities which often are not available to the small foundry.

While the hurdles of equipment, personnel and library may appear difficult, investigation will show that in many in-

(*Concluded on page* 234)

Aircraft bolts being tested on a Riehle P2 Precision Universal Hydraulic testing machine. Below—One of National Lock Co.'s nickel steel aircraft bolts.

How strong is an aircraft bolt?

RIEHLE TESTING

gives "National Lock" the answer

Bolts for aircraft must be plenty strong to withstand the terrific strains and vibrations to which they are subjected. At National Lock Company, Rockford, Illinois, they have been producing thousands of such bolts for 15 years to exact specifications with utmost precision and accuracy. Careful and exact testing of materials is an important part, uncovering defects before production, checking products before shipment and use.

National Lock Company has found the Riehle axiom true—*"One test is worth a thousand expert opinions"*—as have hundreds of other manufacturers. The extreme sensitivity and accuracy of Riehle Testing Machines are the result of their precision construction and assembly. Combined with the utmost simplicity of operation, their precise performance facilitates faster, more exact testing.

RIEHLE *PRECISION TESTING MACHINES*

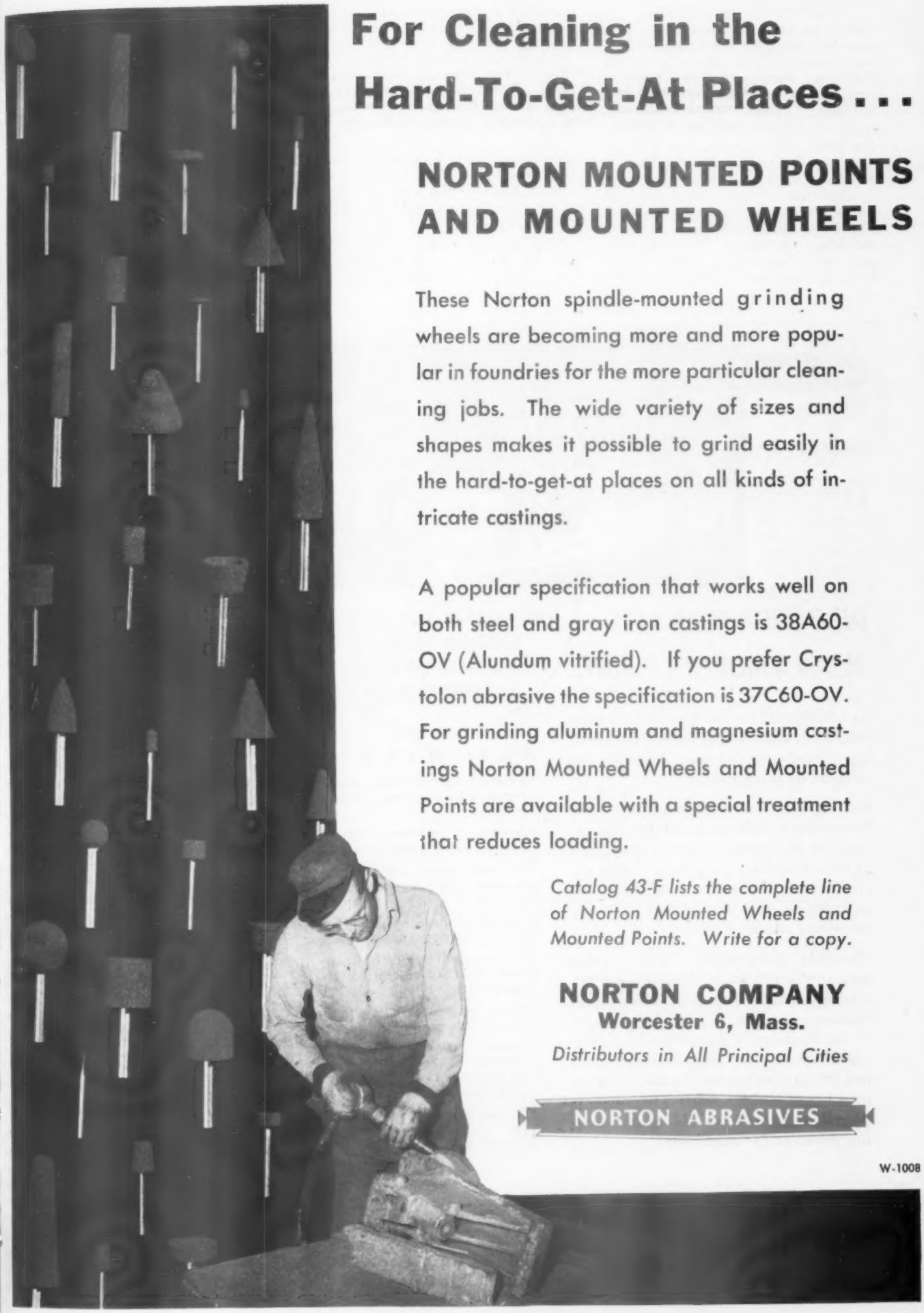
Riehle Testing Machines Division, American Machine and Metals, Inc.

EAST MOLINE, ILLINOIS

HYDRAULIC TESTING MACHINES • TORSION TESTING MACHINES • IMPACT TESTERS • VICKERS HARDNESS TESTERS
BRINELL HARDNESS TESTERS • MEASURING INSTRUMENTS

For Cleaning in the Hard-To-Get-At Places . . .

NORTON MOUNTED POINTS AND MOUNTED WHEELS



These Norton spindle-mounted grinding wheels are becoming more and more popular in foundries for the more particular cleaning jobs. The wide variety of sizes and shapes makes it possible to grind easily in the hard-to-get-at places on all kinds of intricate castings.

A popular specification that works well on both steel and gray iron castings is 38A60-OV (Alundum vitrified). If you prefer Crystolon abrasive the specification is 37C60-OV. For grinding aluminum and magnesium castings Norton Mounted Wheels and Mounted Points are available with a special treatment that reduces loading.

Catalog 43-F lists the complete line of Norton Mounted Wheels and Mounted Points. Write for a copy.

NORTON COMPANY
Worcester 6, Mass.
Distributors in All Principal Cities

NORTON ABRASIVES

W-1008

(*Concluded from page 232*)

stances facilities for such research already are available. Numerous engineering universities and colleges have been conducting industrial research for many years, and undoubtedly others would be interested. Foundry research conducted in such institutions might lead to double dividends. The obvious benefit is provided by the results obtained from research itself. A byproduct might be the development of potential foundrymen whose interest was created either through actual association with foundry research problems, or through knowledge that such work was being conducted, and hence that the foundry field offered some interesting possibilities.

In addition to the institutions of higher learning, there are a number of establishments whose primary object is to foster and conduct industrial research of all types. These include such organizations as Armour Research Foundation, Battelle Memorial Institute, Mellon Institute, to mention but a few. For a number of years both universities and such organizations have been carrying on work relating to the foundry field, but the industry has not financed this work to the extent that seems necessary.

The postwar period, without doubt, will be one of intense competition between different materials and methods of fabrication. If the foundry industry expects to meet this competition successfully, it should prepare now. The old military adage that a good offensive is the best defense still has its merits, and research will supply the offense in developing new and better products and methods.

WORKING WITH ALUMINUM?

Typical layout for die casting, showing compact 20 KW Ajax-Tama-Wyatt furnace in position. Unit comes with complete control cubicle, as shown.

INVESTIGATE THIS UNIQUE HOLDING FURNACE for IMPROVED OPERATIONS and LOWERED COSTS!

INDUCTION FURNACES MEAN A MODERN PLANT..

In addition to the holding furnace here described, small, compact, twin-coil melting furnaces are likewise available for continuous production.

Rolling mills and foundries using Ajax-Tama-Wyatt units have *consistently* developed the highest physical properties in their aluminum products . . . with decreased gas absorption, absence of all segregation, and elimination of oxide inclusions and hard spots . . .

Clean-cut temperature control, great ease and simplicity of handling are operating characteristics. Ajax induction furnaces give you a modern plant, a cooler foundry, a better product. Significantly, too, they have been known to pay for themselves within less than six months. *Write for latest TW catalogs describing both Ajax holding and melting furnaces for aluminum!*

ADVANTAGES

- Every element of uncertainty is removed from holding furnace procedure
- Automatic, positive temperature control to within 5 degrees
- No segregation, iron pickup, or contamination — automatic stirring
- Always ready to operate — no heating up or waiting periods
- Pays for itself quickly by doing away with pot or crucible replacements
- Maintenance costs so low as to be virtually negligible
- Low operating costs — only 12 KW for holding continuously up to 400 lb.; 8 KW when covered on week ends
- Greatly improved overall foundry conditions inherent in induction melting

AJAX TAMA-WYATT INDUCTION MELTING FURNACE

AJAX ENGINEERING CORPORATION • BOX 1418 • TRENTON 7 • N. J.

AJAX METAL COMPANY, Non-Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTROTHERMIC CORP., Ajax-Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting

ASSOCIATE COMPANIES

MACHINE FLAME CUTTING

(*Continued from page 94*)

sections advanced as the cut progresses. In this figure the machine is shown mounted on track preparatory to the actual cutting operation. It is essential to have the machine track mounted on a smooth surface plate; compare the plate indicated as *B* in this figure with the plate indicated as *B* in Fig. 8. The latter plate was cast and machined especially for this purpose.

Fig. 5 shows the actual cutting operation. It will be observed that at all times the operator has readily accessible control of vertical and horizontal position of torch, speed of cutting and characteristics of the cutting flame. Note that a pressure gage is mounted close to the torch, permitting the operator to observe easily the oxygen cutting pressure. Torch and torch tip are again of the size recommended by the manufacturer for cutting the thickness of metal in question—in this case 8 inches. Speed of cutting and cutting pressure are also optimum.

Uses Same Principle

Another operational procedure that can be used in flame cutting risers from castings having internal construction is shown in Fig. 9. While this method cannot be termed machine flame cutting in the strict sense of the term, the principles involved are one and the same. Fig. 9 shows the general arrangement of equipment along with the actual cutting operation. Here we have the casting mounted on a welding positioner, which affords a means for rotating the casting at the required speed. The torch is stationary and is mounted in a torch-holding bracket, which, in turn, is mounted on a fabricated stand. The torch-holding bracket is part of the cutting machine shown in previous figures and is mounted on the stand by means of an adapter pin. Again it will be noted that the operator has at his fingertips complete control of all operations. The thickness of the metal being cut is 6 inches.

Fig. 8 shows a method employed to remove a riser 18 inches in diameter. In this operation the flame cutting machine is mounted on a section of straight track, all of which is supported by a piece of channel iron spanning two horses. It will be noted that the torch in this instance is carried in a vertical position as compared with a horizontal position in the previously described operations.

Fig. 3 shows a procedure used for removing a number of relatively small risers. Here again the flame cutting machine is mounted on a section of straight track. This operation is similar to those shown in Figs. 1, 2, 4 and 5, with the exception that the machine follows a straight and not a circular path.

Figs. 6 and 7 show a relatively large casting before and after removal of risers, *A*, and padding, *B*, by machine cutting. A small amount of manual scarfing, *C*, on irregular surfaces was necessary. Every possible effort was made in this instance to work as closely as possible to finish dimensions in order to reduce machining time to a minimum. Attention is invited to the closeness and smoothness of the cuts. It is unfortunate that the casting, due to its nature, cannot be shown in the machined condition, because this would afford a comparison whereby the savings in machining could be visualized more easily. It will be noted that a number of flame cuts have been made along the sides and ends of the casting to remove padding. This is an indication of possible applications of flame machine cutting.

All of the castings referred to in the foregoing paragraphs were cut before annealing. The castings were not preheated and no heat checks or cracks were observed. The chemistry of the material cut will fall within the following: Carbon 0.20-0.30 per cent, nickel 0.25-1.50 per cent, sulphur, silicon, manganese, and phosphorus normal. Preparation of the casting for cutting is exactly the same whether hand or machine cutting is employed and consists primarily of removing any sand or foreign matter from the location where the cut is to be made.

Space Was Limited

Space limitations in the cleaning room of the foundry in question more or less prevented and discouraged the installation of swing grinders and other types of finishing equipment. Moreover, this type of equipment would have meant an undesirable expense in view of subsequent machining operations which had to be accomplished regardless of how castings were prepared. It was desired by the machine shops that all castings be delivered in a condition which would necessitate only one rough machine cut. While hand flame cutting usually left irregular surfaces requiring two or more cuts, the machine flame cutting technique, as previously described, removed heads and padding within limits desired. The savings in machining time range from about 2 hours on the casting shown in Fig. 4 to 56 hours on the casting shown in Fig. 6. The smoother cuts obtained also reduce tool wear and breakage and are easier on the machines.

With correct cutting technique, machine cutting produces a very even and smooth cut as compared with a rather rough cut obtained by hand cutting. In addition, with machine cutting it is possible to obtain a straighter cut than with hand cutting; this permits working closer to drawing dimensions without undercutting.

The additional equipment in the foundry cleaning room required to produce the machine flame cuts described herein—over and above equipment on hand—included primarily two flame cutting machines, a welding positioner, a surface plate, and several torches and tips. The cost of this equipment was nominal and no additional floor space was required in the cleaning room, although the layout of equipment and flow of work had to be altered to accommodate the new procedures. The resulting increased production in the machine shop could not have been obtained without spending many times the foundry equipment cost, and, in addition, would have required an increase in the number of skilled machinists, which under present conditions is practically impossible.

The machine flame cutting methods required no additions to the foundry personnel, as the men formerly employed on hand cutting were easily trained to operate the cutting machines with a few days' instruction. Moreover, the change was completed without confusion in the foundry. Another advantage of the new cutting technique is that, by eliminating the hand skill required by the old methods, the training of replacement personnel should be greatly simplified and

REJECTS BELOW 1/4 OF 1%!
A Highly Expert Foundryman reports to AJAX

Nonferrous founders have made astonishing records in the last 3 years. The following—for which this representative eastern foundry was thrice awarded the Army-Navy "E"—will appeal to all foundrymen because of its modesty, which is typical, though the achievement is extraordinary.

Send for booklet
"INGOT METALS OF TODAY"

16 STANDARD INGOT METALS BY AJAX

Ajax Tombasil
Ajax Plastic Bronze
Ajax Anti-Acid Bronze
Ajax Phosphor Bronze
Ajax Red Brass Ingots
Ajax Manganese Bronze
Ajax High-Tensile Manganese Bronze
Ajax Golden Glow Yellow Brass
Ajax Nickel-Copper 50-50%
Ajax-Hamilton Gear Bronze
Ajax Manganese Copper
Ajax Aluminum Alloys
Ajax Phosphor Copper
Ajax Silicon Copper
Ajax Nickel Alloys
Ajax Phosphor Tin

NOTE

"Proper Melting Decreases Foundry Losses," contains interesting data. Also, the booklet, "Nonferrous Ingot Metals of Today." Write for both of these. They are free.

"We have used 1,197,924 pounds of your metal, mostly aluminum bronze, manganese bronze, and manganese aluminum bronze. All of this has gone into Army and Navy material. It has been subjected to severe tests, both chemical and physical, in castings weighing from ½ to 750 lb. each. A lot of this had to stand a hydrostatic test of 7,700 lb. On this production, we feel it safe to say that our rejects have been less than ¼ of 1% due first, to your fine quality of metal, and second, to our good luck."

We are always gratified to receive letters of this character, and take pleasure in placing it among many similar ones received during our 65 years in the metal business.

AJAX NON-FERROUS INGOT METALS AND ALLOYS FOR FOUNDRIES
ESTABLISHED 1880
METAL COMPANY · PHILADELPHIA

AMX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting
AJAX ELECTROTHERMIC CORP., Ajax-Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC. The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ENGINEERING CORP., Ajax-Tama-Wyatt Aluminum Melting Induction Furnaces

ASSOCIATE COMPANIES

the time required materially reduced.

In addition to the personnel and major equipment problems, consideration must be given to the gas used for the preheating and the design of the cutting torch. The preheating to 1600 degrees Fahr. required to start the cutting action was produced in this study by an oxyacetylene flame. The cutting torches, finally selected after many tests, were mainly of the three hose type having separate lines for the preheat and cutting oxygen which permit better control of both operations.

It is not the intent or purpose of this article to advocate the use of machine cutting as a cure for all the cleaning room problems. Carelessness in regard to such details as poor cleaning of castings, incorrectly laid-off cutting lines, improper alignment of work, and the support of the head being cut can easily cause trouble. In machine as in hand cutting, slag, sand and scale will deflect the flame and cause the cut to run out. The full economies of procedures, moreover, cannot be obtained without paying careful attention to proper selection and maintenance of the cutting tips and careful regulation of the oxygen and acetylene pressures. Intelligent selection of equipment and ingenious use of it can, however, provide the steel foundry with a useful and valuable tool for simplifying work and reducing costs in the cleaning room.

Named Executive of Magnesium Group

T. W. Atkins, recently assistant vice president of the Defense Plant Corp., Washington, has been appointed executive vice president of the Magnesium Association, with headquarters at 30 Rockefeller Plaza, New York. This association, at present composed of 48 companies engaged in the production, manufacture, fabrication and processing of magnesium, is a nonprofit organization formed to develop the use and acceptance of magnesium and its products.

T. W. ATKINS

With the DPC, Mr. Atkins was in charge of the Management Plants Division, and was a member of the government magnesium mission to England last year to observe the production and uses of that metal in Great Britain's 35 magnesium plants. Prior to his government service he was engaged in the banking business in the Middle West.

Other officers are: President, Edward S. Christiansen, president, the Magnesium Co. of America Inc., Chicago; vice president, C. C. Loomis, president, the New England Lime Co., Canaan, Conn.; treasurer, Clayton E. Larson, operating manager, the White Metal Rolling & Stamping Corp., Brooklyn, N. Y.; counsel, James B. Wesc .t.

Rehiring of Veterans Is Discussed

An analysis, "Rehiring Your Company's Veterans," has been prepared by the Research Institute of America Inc., New York, its purpose being to acquaint employers with their legal and ethical responsibilities toward returning veterans. It provides an exhaustive study of employers' current and postwar personnel problems and the legislation governing rehiring of veterans. Copies are available from the institute, 292 Madison avenue, New York 17.

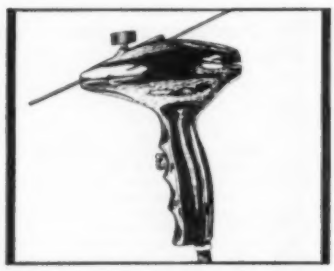
Highly Versatile "Pencil Weld Gun" Welds Cold... Corrects Flaws and Defects ... Saves Man Hours, Materials

The Pencil Weld Gun, used with its Vibra-Weld Transformer, offers simplicity and versatility never before known in the industry. Equally effective in correcting flaws and defects in both ferrous and nonferrous metals—for welding cold, without setting up stresses or crystallization.

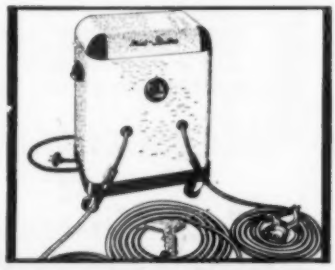
Simple in Operation, the Pencil Weld Gun requires but a few moments' practice to achieve results formerly unobtainable with any method. Utilizing a combination of air, high amperage and low voltage, the weld never exceeds 125° to 130° F. The gun uses a pure aluminum or nickel rod, which is applied directly to the defective area. When the surface has been finished and polished off, it is impossible to detect the repair. Easy to use, as gun peens and welds simultaneously. The Pencil Weld Gun and Vibra-Weld Transformer can be used wherever 220 volt single phase electricity and air outlets are available.

Unavailable, however, is Wrigley's Spearmint Gum. As the makers of Wrigley's Spearmint are unable to continue manufacture of the product up to their quality standards under present conditions, the only unqualified protection they can give to the consumer and the dealer alike is to keep the Wrigley's Spearmint wrapper empty. While they advertise this empty wrapper, none is being made and any found on the market is old production of a perishable product.

You can get complete information from
Mid-States Equipment Company
2429 South Michigan Avenue, Chicago 16, Illinois



Close-up of new Pencil Weld Gun



Pencil Weld Gun with Vibra-Weld Transformer

Z-66

Exact control

Birds are recognized by their size, coloring, habits—and songs. A trained ear can identify any songster by its warbling. Because birds control their notes so exactly, their identities are never confused.

Since 1873, more and more foundrymen have perfected their castings and have eliminated confusion with a control as exact as a bird's warble.

Globe Silvery Pig Iron, known for 72 years to be an essential ingredient in gray iron and malleable casting mixtures, has been the basis of this control.

Through the medium of select Lake ores and rigid metallurgical specifications, Globe has included grain sizing in Silvery Iron to further assist the foundryman to meet present day requirements in casting perfection.

BESSEMER FERRO-SILICONE
GLOBE IRON COMPANY
THE PIONEERS OF SILVERY IRON
SPECIAL HIGH SILICON GRADES

You can't think of Silvery Iron without thinking of Globe!

GLOBE IRON CO.

JACKSON, OHIO

NEW EQUIPMENT and SUPPLIES

(1)—Swing Tables: American Foundry Equipment Co., Mishawaka, Ind., has added several new models to its line of swing tables which utilize the company's airless abrasive blasting unit. Work to be cleaned is placed upon a rubber-covered work table which is mounted on the door of the blast cabinet. As the door is closed, the work table swings into the cabinet underneath an airless blast unit. The table is rotated at a predetermined speed while the unit whips a continuous stream of abrasive down upon the rotating work so that all surfaces are uniformly blasted to a bright, clean finish. Four sizes are available, including 24, 66, 72 and 86-inch table diameters.

(2)—Face Shields: American Optical Co., Southbridge, Mass., is introducing four new face shields which provide light-duty protection on operations such as metal sawing, acid handling, buffing, sanding and light grinding. Three types of button-on windows for the shields are available, including clear cellulose acetate for general purposes, 24 mesh screen for heat protection, and fibre with a filter glass window for welding and scarfing. Leather sweatbands, like the windows, button on and are easily removed. Different types of head protection are afforded by the various models.

(3)—Inspection Unit: Magnaflux Corp., 5900 Northwest highway, Chicago 3, announces a new portable unit designed to provide a source of suitable current for magnetic particle inspection in foundries and welding shops, including detection of shrinkage cracks, hot tears, blow holes, porosity, etc., in castings. It delivers high-amperage, low-voltage current for both direct-current magnetization and alternating current magnetization and demagnetization. Maximum output rating for the former is 1850 magnetizing amperes, or 1000 amperes continuous duty. For alternating current output the rating is 2500 amperes maximum and 500 continuous duty. The unit has an overall height of 38 inches and requires a 33 x 36-inch floor space. No auxiliary equipment is required except the Magnaflux powder blower.

(4)—Crane Cab: Cleveland Crane & Engineering Co., Wickliffe, O., has developed a new cab for overhead traveling cranes to provide full vision for the operator, comfortable sit-down control and air conditioning. Transparent enclosure panels, made of shatter-proof plastic, extend to the floor and are reached for cleaning purposes by means of a traveling platform, as shown in the illustration. The platform also serves as vestibule to the cab. Master switches are located for greatest convenience, hoist and trolley switches being attached to the chair arms and the bridge switch being controlled by the right foot. An air conditioning unit introduces clean and cooled air into the cab, the unit shown being for use where temperatures do not exceed 140 degrees.

Rectifier: Green Electric Laboratories, 130 Cedar street, New York 6, is offering a new rectifier designed to furnish laboratories direct current power with extreme flexibility in voltages ranging between zero and 48 volts. Built-in voltmeter and ammeter indicate the direct current output voltage and current

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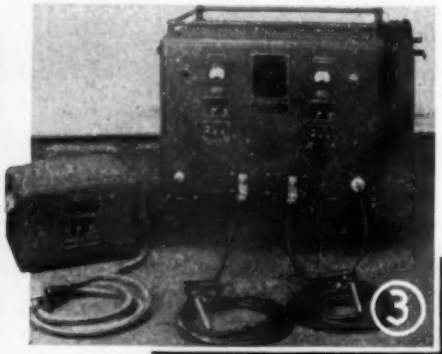

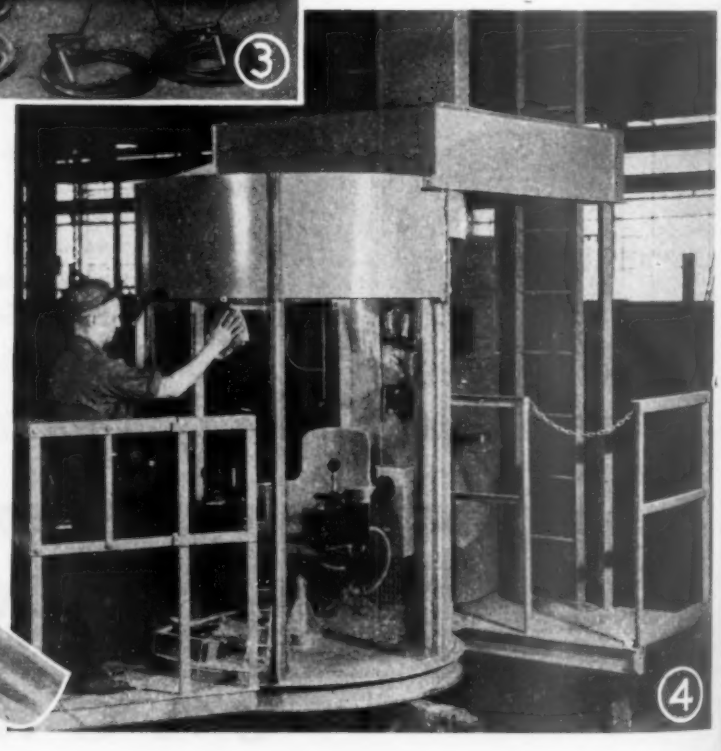

TOMORROW— . . . *The Helicopter*

destined for post-war perfection, this radical departure in airplane design will bring wings to those who are now deprived of the advantages of air transportation.

TODAY—

VELSICOL

Coresin

Oil

This product of advanced chemical and engineering research makes available today the benefits of progress which in other fields is delayed until the postwar period. Skilled craftsmen are gratified by the discovery of a consistently uniform core oil that has good workability in the core box and is easy to mix in core sands. They find that cores baked with VELSICOL CORESIN Oil are superior in ease of shakeout and have greatly reduced gas content.

The care which goes into the formulation of Velsicol CORESIN Oils explains why they lead in the production of cores, large and small, simple and complex, for ferrous and non-ferrous metals in America's great foundries.

FIND OUT FOR YOURSELF

how these oils can improve the quality of your cores and increase castings output. Phone, wire or write to the representative in your territory or direct to us for samples and full information.

VELSICOL

VELSICOL Corp.

General Offices: **120 E. Pearson Street • Chicago, Ill.**

The Foundries Materials Company, Coldwater and Detroit, Michigan and Hammond, Indiana; Midwest Foundry Supply Company, Edwardsville, Illinois; H. S. Stoller & Company, Akron, Ohio.

(*Concluded from page 238*)

at all times. Additional features include a three-phase magnetic contactor in the main power supply circuit with on-off push buttons, pilot lamp, buzzer for overload warning, and automatic current interruption in case of prolonged overload. The unit is available for operation from 220 to 440 volts at 60 cycles.

Welding Helmet: Chicago Eye Shield Co., 2500 Warren boulevard, Chicago 11, has perfected a new air-fed welding helmet, originally designed by Pullman-Standard Car Mfg. Co., and Northwestern University Medical School, Chicago, which is said to reduce worker fatigue and improve morale. Fresh air, scientifically fed into the helmet through a supply tube encircling the lens holder, flows along the shell and travels to every outer edge. Directional flow of the fresh air prevents stale or fume-laden air from entering. Heat is cut down.

Shear Clutch: Canton Division of Hill Acme Co., 6400 Breakwater avenue, Cleveland 2, announces the installation of a new air operated stop motion clutch on its line of alligator shears. The clutch, which requires air pressure of only 70 pounds, eliminates practically all wearing parts except the clutch face, insures trouble-free operation and can be installed on any shear in the company's line.

Pattern Vibrator: Martin Engineering Co., Kewanee, Ill., announces a new type of air vibrator which is said to introduce a new principle of vibration into foundry practice. Attached to a pattern plate, the device produces a circular vibration which raps the pattern in all directions, duplicating the method

of rapping employed by the skilled molder. Comparatively quiet in operation, the vibrator is adjustable for speed and intensity of vibration to accommodate varying requirements.

Safety Splice: American Chain & Cable Co. Inc., Bridgeport, Conn., announces a new method for splicing preformed wire rope which renders hand-tuck splicing unnecessary. Flexible clear to the terminal, the splice maintains equalization of stresses in all strands,

applying the load stress in direct line with the pull of the load. It may be used with standard hook, ring, shackle or thimble fittings which may be salvaged when the sling is retired. At present the new splice can be applied only at the factory.

Groove Centers: Chicago Mfg. & Distributing Co., 1928 West Forty-Sixth street, Chicago, has made available helical groove centers with cobalt-tungsten alloy tips which assure "red hardness" on even the most difficult cutting operations. The abrasion-resistant alloy is torch welded onto the center tip, midway from the point, which fuses the alloy with the steel base of the center.

Cleansing Cream: Dennis Chemical Co., 2701 Papin St. Louis 3, has developed a new cleansing cream for removing lacquer, paints, enamels, varnish, resin solutions, inks, dyes and other resistant materials from the hands. The cream is used after, not before, work.

FOR EVERY FOUNDRY PURPOSE

Goose Lake

FIRE CLAYS

• The most widely used of all fire clays in midwest foundries. They supply every bond and refractory requirement. These clays are prepared in a large, modern grinding plant, which for 32 years has served the foundry industry with prompt and dependable shipments.

Valuable consultation is available with experienced engineers for the best use of fire clays in foundry bond and refractory service. They often supply important help for the reduction of foundry scrap losses.

A new booklet with many pictures about the production of Goose Lake Fire Clays is available upon request. Write now for your copy.

Make "your" next car of fire clay GOOSE LAKE

Illinois Clay Products Company

FIRE CLAY • CLAY BOND • BRICK • BLOCK

JOLIET, ILLINOIS

Exceptional HEAT UNIFORMITY

...with MAEHLER ovens...

. . . mean more uniformly baked cores

RECENT TESTS SHOW . . . temperature variations of only 5°

93.6%
OF MAEHLER'S PRODUCTION
IS DEVOTED TO REPEAT ORDERS!

". . . . . There is no better proof of the superiority of Maehler ovens and furnaces.

A Few Users of
MAEHLER EQUIPMENT

AMERICAN BRAKESHOE & FOUNDRY
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MAEHLER'S leadership in developing the recirculating air heat system for industrial ovens has resulted in a line of equipment that gives heat uniformity that is virtually *perfect!* Recent tests show that a Maehler oven operating at 500°F fully loaded maintained a heat uniformity within 5°, through high volume and rapid air heat circulation and highest grade instruments. This kind of temperature control means uniform baking . . . no under-baked nor over-baked cores.

Maehler core and mold ovens are available in a complete range of oil fired, gas fired and electrically heated units, incorporating the Maehler recirculating principle for high uniformity and output, at low cost.

Let us quote you on your requirements.

THE PAUL MAEHLER COMPANY
2208 W. Lake Street • Chicago 22, Ill.

MAEHLER

Industrial Ovens and Furnaces for Core Baking, Mold Drying, Heat Treating, Enameling, etc.

WASHINGTON *Notes* ★★★

DOWNWARD revisions in the military procurement program are being accelerated with the passage of VE-Day. Curtailment in production of some items during coming months will be sharp, in others relatively small. Gaps in our industrial capacity which can be filled by manufacture of civilian goods are beginning to appear, but the requirements of the Pacific war remain large—unusually so, except when measured against the tremendous war production of the past few years.

★ ★ ★

Munitions programs necessarily are fluid, but the situation recently was about as follows. Until Germany folded, scheduled production for the year beginning this July 1 totaled about $56 billion—approximately the same as in the calendar year 1943 and less than 10 per cent below 1944. The Nazi eclipse permits a cut of a little more than 14 per cent to $48 billion. The decline will be a progressive one, so that while the 12-month cut will be relatively small, monthly production a year from now will be less than $3½ billion. In March this year munitions output totaled nearly $5 billion.

★ ★ ★

ON THE basis of the foregoing figures it will require 12 months for the recent war load on industry to be lifted 30 per cent. In this connection it will be recalled that last summer WPB officials were thinking in terms of a 40 per cent reconversion at the end of the European war. In some cases the cutbacks will be that much or more, but the shift to a one-front war will require increased supplies of certain other items. Moreover, developments in the Pacific campaign easily could cause important changes in present tentative programs.

★ ★ ★

As instances of varying cuts in production of different types of munitions, fourth quarter output of tanks is expected to be down to about 3000, or less than one-half its previously proposed schedule, but requirements for light-heavy and heavy-heavy trucks probably will be increased as more troops shift to the Pacific theater. Cutbacks in aircraft production announced in April by the Army Air Forces were designed to adjust schedules to the Pacific war and are expected to mean a 15 to 20 per cent drop for this year compared with the early 1945 pace.

★ ★ ★

DESPITE the huge military programs still ahead, the retrenchment will free a large amount of materials, manpower, and plant facilities, although the switch to manufacture of civilian goods will be retarded by continued scarcity of certain materials and by the first call that civilian requirements closely related to successful prosecution of the war will have upon this released production capacity. This latter group includes transportation and other utilities, farm implements, mining machinery, etc.

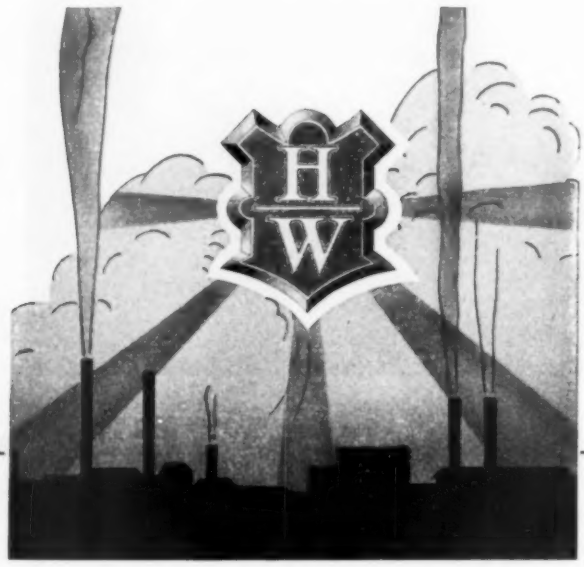
★ ★ ★

Inventory absorption permits a larger cut in demand for components and basic materials than would appear to be dictated by the drop in the munitions schedules. In some cases, program cutbacks have left manufacturers with more than enough inventory to finish the remaining portion of their contracts, and procurement has stopped. In other instances, procurement of components and materials is being reduced sharply below the level of consumption until inventories are in line with the lower production schedules.

★ ★ ★

THE NEXT three months are expected to see military programs take 2 to 3 million tons less of steel and proportionate cuts in most other metals compared with the previous rates. Similarly sharp reductions will be made in military requirements for

(*Concluded on page 244*)



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Yes, you'll find the Hickman-Williams' man *is* the foundryman's friend. His intimate knowledge of foundry practice gained through practical experience enables him to give more than ordinary service. . . . Through his willingness to help solve foundry problems, he has made many friends. . . . But most important, you'll find that he gives each transaction his close personal attention; that he can be relied upon to give you the kind of service you expect.

When it comes to ferro alloys, pig iron, shot, grit, fluorspar, coal and coke, call the Hickman-Williams' man. He'll be there when you want him.

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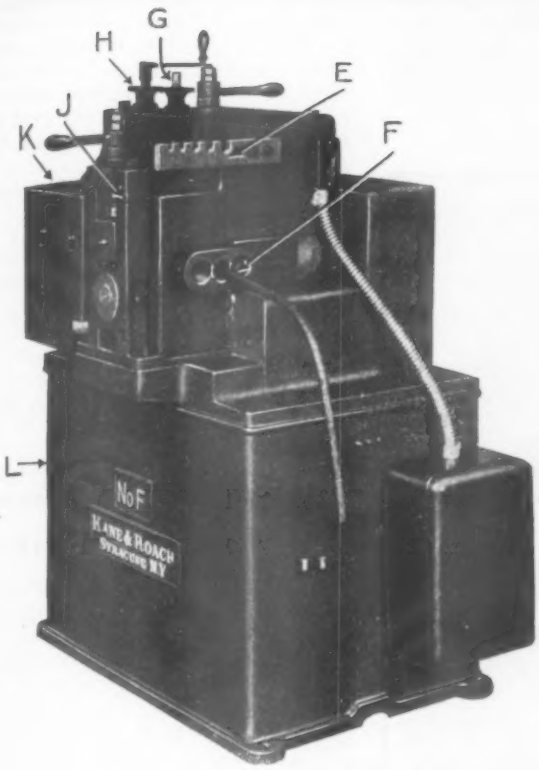
No prudent foundryman would sneeze at savings of $75.00 to $150.00 a month



K. & R. No. F 5-Roll Core Wire Straightener

E KINK BAR, HARDENED.
F FEED FUNNEL, HARDENED.
G ADJUSTING SCREW, TOP ROLL SHAFTS.
H LOCK NUT, ADJUSTING SCREW.
J OUTER BEARING, PINCH ROLL SHAFTS.
K CAST IRON GUARD, ENCLOSED ROLLS.
L CABINET BASE, ENCLOSES AND PROTECTS MOTOR.

In this era of easy money, monthly savings of $100, might be considered peanuts, but smart management pyramids small savings into big profits. The KANE & ROACH CORE WIRE STRAIGHTENERS, for example, relieves men of the task of straightening bent core wire by hand. It salvages used wire by the ton, quickly, cheaply and efficiently. Scores of foundries have purchased three and four K. & R. machines. K. & R. machines restraighten used core wire over and over again, just as long as the wire is usable. A cutoff shear can be supplied to be used in conjunction with the Core Wire Straightener for straightening and cutting to length new wire from the coil. Core Wire Straighteners are built in two sizes to straighten wire from .080 up to and including ¾" and can be furnished with five, eight or nine rolls. Specifications and quotations will be furnished promptly on receipt of your request giving diameters of wire to be straightened.

REPORT FROM ONE USER
Typical Week's Record With Straightener

	12 ga.	8 ga.	6 ga.
Monday	60	247	107
Tuesday	62	258	50
Wednesday	58	279	
Thursday	60	229	
Friday	62	270	192
Lbs. each size per week	302	1283	349
Per 100 lbs.	$5.15	$5.00	$5.00
Salvage	$15.55	$64.15	$17.45
Total Salvage			$97.15
Wages (Including Handling and Sorting Time)			26.00
Saved			$71.15

KANE & ROACH, INC.
SYRACUSE, N. Y.
ESTABLISHED 1887

(*Concluded from page 242*)

a number of recently tight items, such as electric motors and antifriction bearings. On the other hand, no relief is in prospect from the scarcity in certain textiles and in leather, while in lumber heavy consumption for redeploying materials from Europe will partly offset the reduction in total munitions shipments.

★ ★ ★

While we have seen the worst in the manpower situation, a spotty picture as regards labor supply likely will prevail for some time. Various factors will influence the matter, such as how many women and older people decide to withdraw from the labor market, how many employes released by shipyards and other war industries decline to take new jobs other than those involving civilian goods, and how many and how fast war veterans are released for return to industry.

★ ★ ★

WPB has started revocation of a substantial part of its recently existing 420 orders of various types. Influence of the Controlled Materials Plan is being lifted so that starting July 1 delivery of steel, copper and aluminum will be permitted without CMP allotments provided there is no interference with authorized orders. In general, the aim is to make freely available for civilian purposes those materials and production facilities not required for the war effort but at the same time to see that there is no interference in supplying everything needed by the Pacific forces. Moreover, provisions prohibiting accumulation of unreasonable inventories will not be relaxed until supply and demand approach equilibrium.

★ ★ ★

At the moment, the date for resumption of automobile production is somewhat indefinite—variously estimated by government men at 6 to 9 months hence. One question bothering some Washington officials is where the automobile industry is to obtain the textiles it needs, since requirements are placed at 40 yards per car. Good progress in the synthetic rubber program—recently within 5 per cent of the plan proposed many months ago by the Baruch committee—is expected to prevent tires from being a serious bottleneck in the automotive revival.

★ ★ ★

PIG IRON inventories in producers' yards are the lowest in 18 months, and consumers' stocks also are relatively small, both situations having been caused partly by the tight supply of scrap. No early improvement on any major scale in supplies of better grades of scrap is indicated.

W. G. G.

Getting a LIFT with a Stearns MAGNET

Assembling this 4000-lb. track would be a tough job without Stearns Lifting Magnets. This is only one of many applications for Stearns magnets that help speed production in busy war plants.

Moving large quantities of material in fast time at low cost—guarding hand labor on difficult and dangerous operations, conveniently, safely and economically.

Increasing storage capacities, loading and unloading are a few of the advantages of using Stearns Lifting Magnets.

Let Stearns magnets give you a lift. We make 'em in many sizes and shapes. Why not consult Stearns Magnetic Milwaukee with your problem.

Write for our Bulletin 35

STEARNS MAGNETIC MANUFACTURING CO.

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Abstracts of Enemy Patents Available

Abstracts or short descriptions of about 45,000 United States patents and patent applications, seized from enemy aliens and nationals of occupied countries and now available for license to American citizens, have been published by the Alien Property Custodian.

The abstracts are divided into two groups, one Chemical and the other Mechanical-Electrical. The latter, covering about 37,000 patents and patent applications, are grouped into the 300 classes and subclasses used by the U. S. Patent Office. The complete set, involving five volumes of 4300 pages, sells for $25. Prices of individual classes, one of which covers metal founding, vary with the number of abstracts and may be obtained from the Office of Alien Property Custodian, 135 South LaSalle Street, Chicago 3.

Most of these patents are available for licensing to American citizens for an administrative fee of $15 per patent, on a nonexclusive basis for the remaining life of the patent, and are royalty free, except for those of enemy-occupied origin.

Traces Development Of Carborundum

"How Carborundum Serves Industry," an attractive booklet describing the development of its abrasive, refractory and heating element products, has been published by the Carborundum Co., Niagara Falls, N. Y. Pictures show various steps in manufacturing processes, also the different applications of the company's products.

Even the largest size...

takes less than 28 sq. ft. of floor space

including the motor

Another Modern Compressor Design Pioneered By Sullivan

- heavy duty
- trouble-free
- precision-built
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Stationary and Portable Air Compressors from ¼ to 3000 H.P., Pneumatic Casting Grips, Foundation Breakers, Portable Hoists, Rock Drills.

THE MODERN DESIGN of Sullivan WG-9 air compressors gives them greater capacity per square foot of floor space — as much as 43 C.F.M. per square foot on 100-lb. rated machines.

Sullivan WG Series Compressors are heavy duty, single-stage, double-acting units that are specially designed for continuous service where volume requirements are moderate. Long, trouble-free operation is assured by full force-feed lubrication to all working parts . . . replaceable cylinder liners and crosshead guides, and anti-friction main bearings. Because of their compactness and simple block type foundations, they can be installed quickly, easily and economically right where the air is needed. Available in eleven sizes with displacements from 153 to 822 C.F.M. at pressures from 30 to 150 lbs. Bulletin A-43 will give you complete details. **Sullivan Machinery Company, Michigan City, Indiana. In Canada: Canadian Sullivan Machinery Co., Ltd., Dundas, Ontario.**

Complete your compressed air plant with a Sullivan Aftercooler. Sullivan Aftercoolers remove water vapor and entrained oil from compressed air by effectively condensing the vapor and isolating the condensate and oil before they enter the distribution lines. Because they deliver cool, dry and clean air they quickly pay for themselves.

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BY

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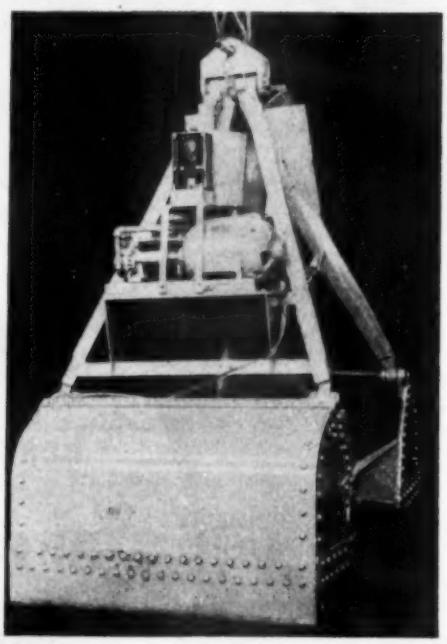
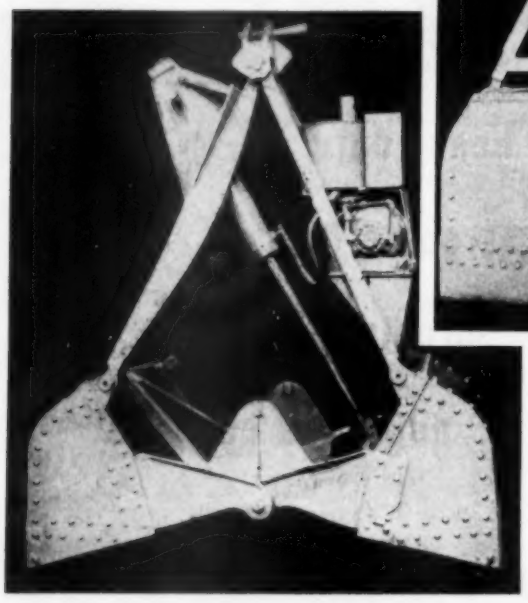
This is a new hook-on fast operating electric bucket. Can be made to operate on either A.C. or D.C. The bucket operates on a new patented principle.





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ANOMALIES OF GRAPHITIZATION

(*Continued from page* 101)

face only. The specimen at right with longer exposure at high temperature has an outer band of badly deteriorated metal, then a band containing some pearlite and cementite, then another band containing much more pearlite and cementite and finally a central area free of carbides.

These experiments indicate that carbon dioxide plays a prominent role in this carbide stabilization and it would appear that a penetration of carbon dioxide into the metal in some manner is essential.

Normal cupola melted gray iron, both with and without ladle additions of ferrosilicon, carried through the same heat treatments did not react the same as the gray iron produced from white iron by ladle additions of ferrosilicon. In many cases the cupola melted gray iron showed no noticeable carbide formations, although they would deteriorate markedly in the high temperature exposures in all three atmospheres.

Some Evidence Appears

In some cases there was some evidence of this or a similar phenomenon. Disks approximately ½-inch thick cut from a 1.2-inch diameter gray iron test bar exposed to 1700 degrees Fahr. in atmospheres of air or products of combustion for an hour or two and oil quenched, had a solid eutectoid carbide matrix. A short exposure to a temperature below the critical resulted in the decomposition of all the carbides except a thin saucer shaped sheet at the cut faces, the rim of the saucer being at the cut surface. Prolonging the exposure at high temperature did not greatly increase the penetration, as was the case with the gray irons produced by ferrosilicon additions to white iron. Very prolonged exposure in oxidizing atmospheres resulted in the deteriorated metal overtaking the carbide area.

Fig. 3 gives some idea of the effect of penetration and deterioration in the case of gray iron that has been cut or fractured to remove the more impervious cast surface. This specimen is a bar 1-1/4 x 2 x 12-inch cast from a soft gray iron. Each end was sawed off and four ½-inch holes drilled. Then the specimen was put through a full malleablizing cycle twice in an atmosphere not sufficiently oxidizing to produce scale.

The second anomaly has to do with aluminum. Aluminum, in general, is a very powerful graphitizer but it too seems to have its perverse side.

Consider a white cast iron such as is used in the production of malleable cast iron. Additions of aluminum in small amounts, in some cases just a few one hundredths of 1 per cent, will cause some primary graphitization and will be

(*Concluded on page* 248)

A FEW MINUTES....A FEW PENNIES

AND THE FULL BATCH IS CLEANED IN

Ransohoff WET CLEANING MILLS

Costs go tumbling in these cleaning mills. For example, the mill illustrated cleans malleable iron castings for about 28c a ton . . . instead of the former cost of $2.50 per ton.

Automatic Handling of Stars . . . Easy . . .
Economical . . . Not Self-Destructive Operation

What the photograph shows: END-LOADING, END-UNLOADING 60"x72" automatic star return wet cleaning mill. Work is loaded into the mill from shop cans hung on monorail hoist. The mill discharges onto pallets on roller conveyor. The pallets may be moved along while mill is unloading, distributing work on the pallets. These pallets form an inspection table where the work is inspected, sorted and placed in receptacles while the next batch is being cleaned.

Pallet is surrounded by a light rail which forms an anvil on which work may be chipped while being sorted. A hot basic solution circulates over the work while being cleaned.

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N. Ransohoff, Inc.

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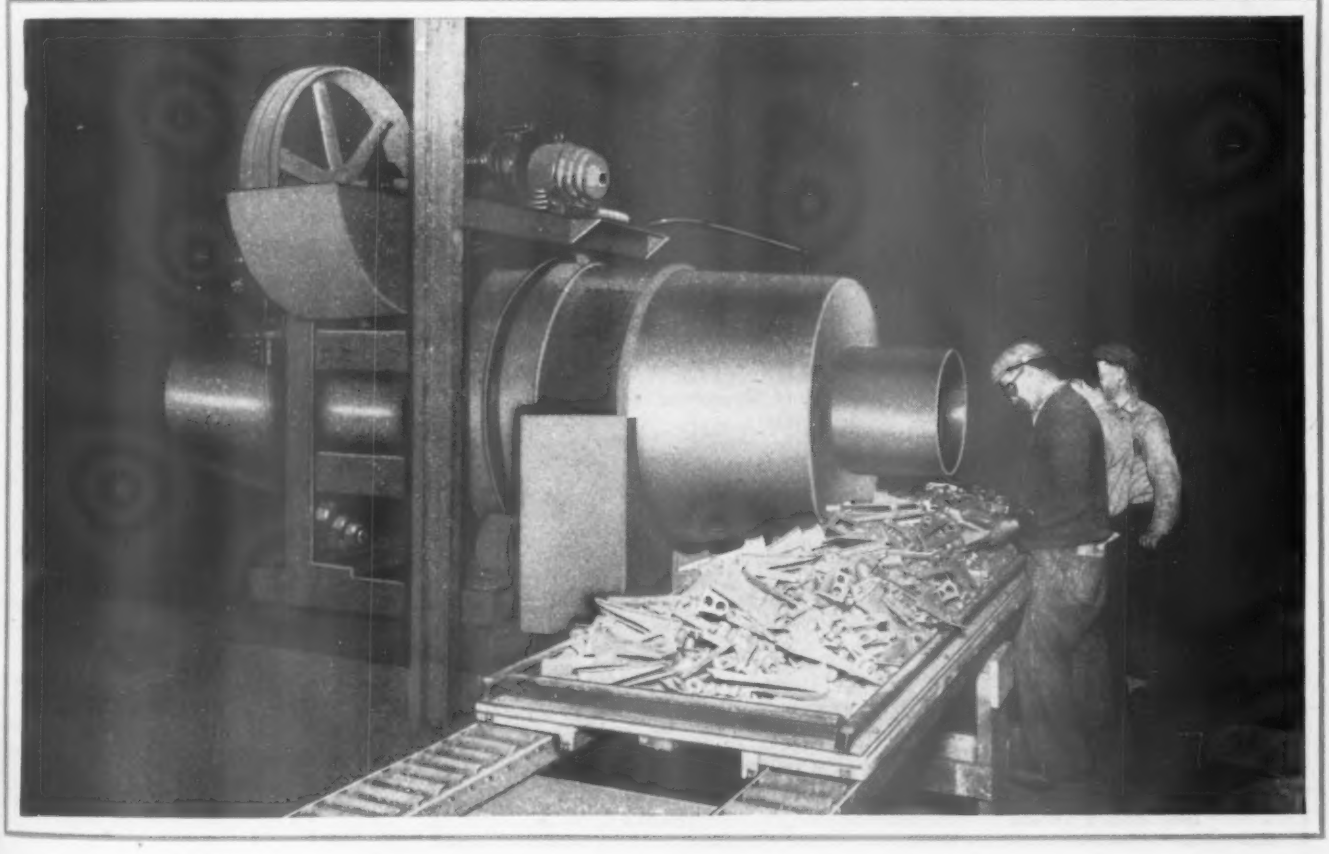

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The Alnor portable Pyro-Lance is a rugged, durable, portable pyrometer built with shock-resisting movement and enclosed extension thermocouple. It stands up in foundry service and gives the accurate temperature readings essential to low-cost production of sound castings. Especially suited for use on molten brass, bronze, copper, aluminum bronze, magnesium alloys, and similar metals where temperatures are not over 2300 F. Long life, enclosed thermocouple takes true readings below the surface, unaffected by dross or surface conditions.

Built in standard range, 0-2500 F. Also with bare wire thermocouple for low temperature metals in crucibles or ladles. Write for bulletins giving complete description.

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High Alloy Steel Centrifugal Casting showing cross sections formerly made from a series of forgings. Thin section 1/16-inch—100 per cent X-Ray Inspection.

W. G. REICHERT ENGINEERING CO.
1060 Broad Street —*Foundry Specialists*— **Newark 2, N. J.**

(*Concluded from page 248*)

helpful in promoting decomposition of pearlite in the second stage of the malleablizing process. However, aluminum ladle additions in the amount of 0.04 per cent or more, whether or not any primary graphitization occurs, frequently result in metal with sparkly fractures and retaining appreciable amounts of small carbide nodules, while processed along with it a similar specimen with no aluminum or a smaller amount will have a normal black fracture and be free of all carbides.

This phenomenon is more pronounced in some sections than in others, indicating the cooling characteristics in the mold have an effect on it.

Fig. 5 shows the fracture of an extreme example of the effect of 0.04 per cent aluminum. The specimens are bars 1 x 1 1/4 x 4-inch well fed to eliminate shrinkage. The specimen on the left had no aluminum added. It had a good black fracture and was free of carbides. The specimen on the right was the same metal but with a ladle addition of 0.04 per cent aluminum. It had a very sparkly fracture and contained appreciable cementite as shown in Fig. 4. The aluminum seems to have no stabilizing effect on the pearlite.

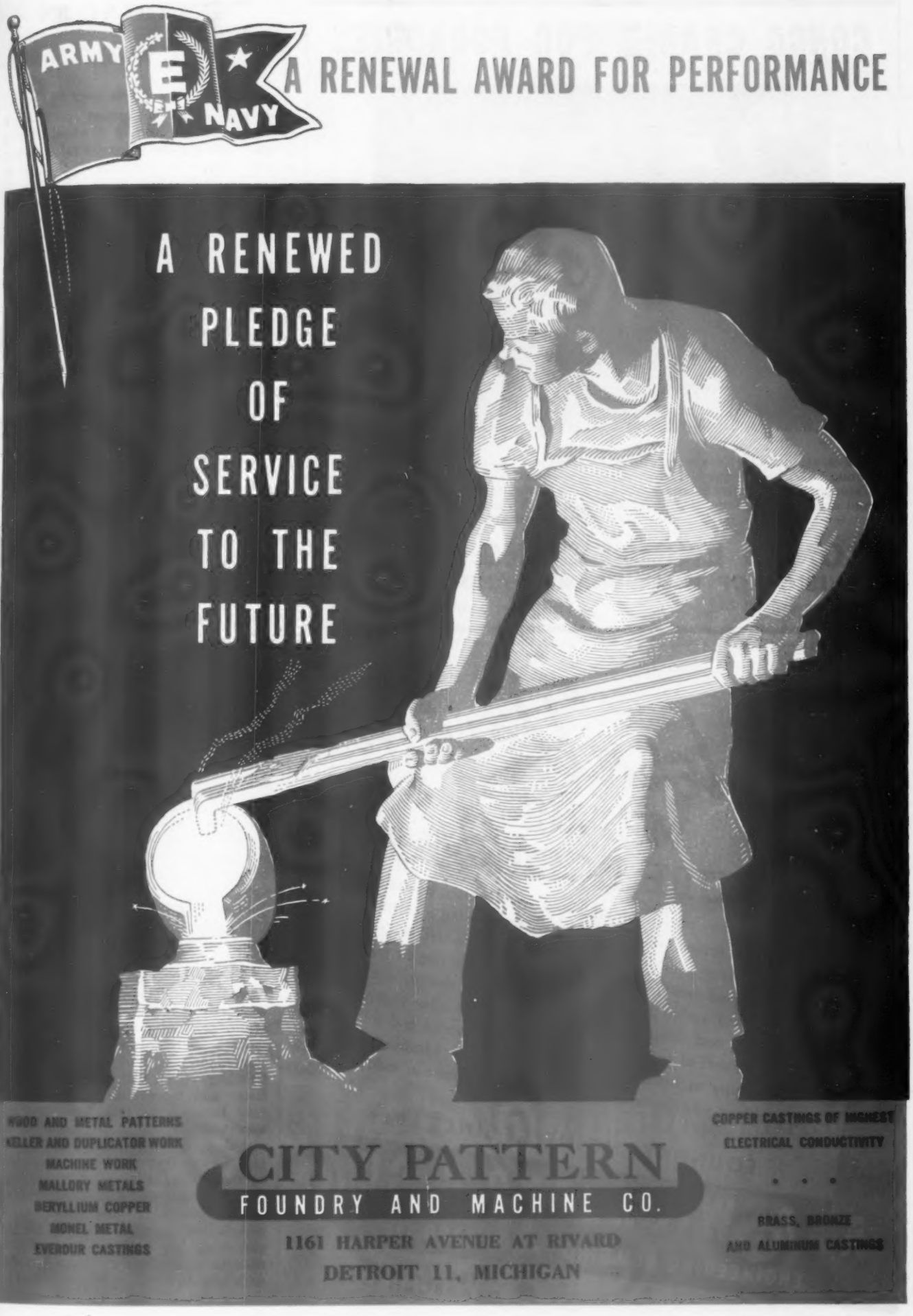
Amounts of aluminum greater than 0.04 per cent do not seem to be either more or less effective in retaining some cementite. Larger amounts, for example 0.30 per cent aluminum, while producing appreciable primary graphite and aiding or at least not hindering the decomposition of pearlite, will frequently allow appreciable cementite to remain while a similar specimen without the aluminum will be free of carbides.

Offers New Welder's Reference Chart

American Optical Co., Southbridge, Mass., is offering a new reference chart for welders which points out the proper shades of filter lenses for different types of welding operations. In oxyacetylene torch cutting and welding the shades of filter lenses are classified according to light, medium or heavy cutting. The shades for electric welding are classified according to the different diameters of welding rods. Copies of the chart can be secured free of charge on request.

Issues Labor Guide

Labor Relations Institute, New York 19, has published the first of a series of special reports on collective bargaining techniques, "How To Avoid Unfair Labor Practices." The book, a practical guide to employer behavior during and after a union organizing drive, gives NLRB instructions covering violations of the Wagner Act, and company domination. Copies of the book may be secured from the institute for $1. to members, $1.50 to others.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GRINDING IN FOUNDRIES

(*Continued from page* 95)

general effect of greater pressure is higher rates of cut and of wheel wear in such order as to lower total grinding cost. Improved economy is thought to be due to broader contact. The face of a snagging wheel is always more or less rounded. More pressure sinks it further into the work and thus broadens contact. The advantage due to higher pressure is positive. When higher rates are gained by use of a softer wheel at the old pressure, the net result may be either a gain or loss in economy.

Practical limits in going to higher pressures are fatigue of operator, danger of wheel breakages and work requirements. Pressure must be kept low enough to allow the operator complete control of the operation.

In general the discussion is intended to be a statement of some of the principles which are the foundation of economy in snagging. They apply mostly to cases in which substantial amounts of metal are removed from the work, since on a few jobs increased rate of cut is of little or no advantage in speeding production. For example, if a piece of work requires only skinning, and if, for some reason, the wheel cannot be moved over the work any more rapidly than at present, a faster cut would save no time but would waste metal.

Conditions Not Constant

It is difficult, if not impossible, to generalize the grinding operations in foundries. Each foundry has its own problems which vary from time to time with the different kinds of work.

In the jobbing foundry, the machines and wheels must be of general utility. Floorstands mounting 20-inch or 24-inch wheels of medium, hard grade are used. Benchstands using stubs of the larger wheels and thinner, smaller wheels are used for special grinding operations on smaller castings.

Portable grinding machines, electric or air driven, are being used more extensively every day. The wheels are either 6 or 8-inch diameter, ½ to 1-inch thick. Also, shaped wheels such as 6-inch cup wheels or different sizes of cone wheels are used. It is advisable to have an assortment of these shaped wheels to take care of any job that might come up. Grinding wheels will do the work much faster and more accurately than chipping hammers or hand files, but it is important that the most convenient size and shape of wheels are used. One can readily see that to do the best work on the various curved surfaces, different shaped wheels are required. No doubt all foundries have some special shaped wheels but it might be possible that something has been overlooked if one tries to grind intricate shaped castings with wheels not suited for the work.

(*Continued on page* 252)

JACKETS

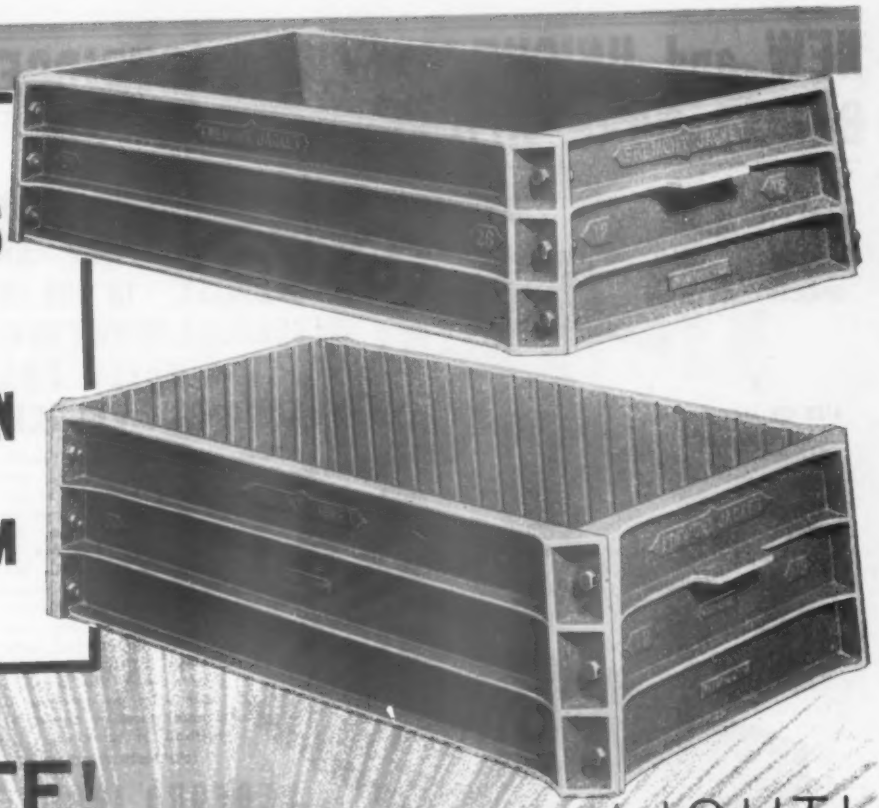
FURNISHED

IN

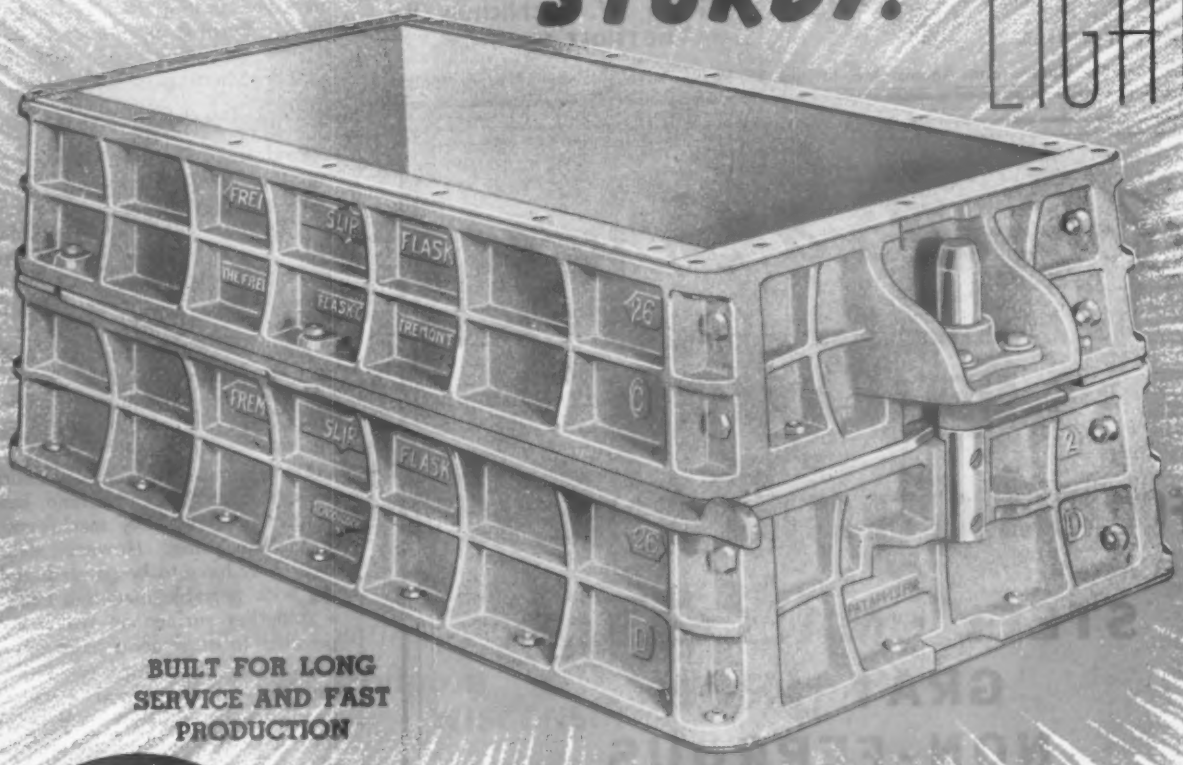
CAST IRON

OR

ALUMINUM



ACCURATE! STURDY! LIGHT!



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GROOVLOCK

THE FOOL-PROOF PIN

FREMONT MAGNESIUM FLASKS

THE FREMONT FLASK CO.

Fremont, Ohio

NEW and UNIQUE! » THE CARTRIDGE BENCH CORE BLOWER

SPECIFICATIONS

A
SIZE OF MACHINE BASE—20" x 26"

B
CLEARANCE FOR CORE BOX AND CARTRIDGE—18"

C
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WEIGHT—200 LBS.

PRODUCES SMALL INTRICATE CORES WITH REMARKABLE SPEED AND SIMPLICITY. IN USE IN SEVERAL LEADING FOUNDRIES. WRITE FOR DESCRIPTIVE FOLDER.

. . . . fills the need for a simple, flexible blower and has raised quantity and quality of work at a minimum of expense. It requires no large volume of air for small cores and no adjustment for difference in height, size or shape of coreboxes is necessary. Coreboxes can be very light. The need for strict moisture control of sand has been greatly reduced, permitting the use of almost any core bench sand. Thus by eliminating sand trouble the quality of intricate work that may be done with the machine is greater than by any other method of blowing.

(Patents Pending)

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PRACTICAL FOUNDRY ENGINEERS

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141 WEST JACKSON BLVD. • CHICAGO (4), ILL.

(*Continued from page 250*)

Cutting-off machines are used to cut heads and risers mostly on nonferrous castings but also for hard and heat resisting alloys. The greatest advantage is the saving of time, and castings can be cut close enough to eliminate further grinding. Area of the section to be cut determines largely whether the cutting-off will be cheaper than sawing.

Increased heat will wear the wheels faster, and the larger the section the more heat will be generated. It is true that the use of special machines and water cooling will enable us to cut larger cross sections at a lower cost. If we compare the cost of cutting between saws and cutting-off wheels we find that for mild steel the greatest section to be economically cut is about 1½ inches thick. On less hard metals this section is increased in proportion to the hardness of the metal. If a comparison is made between cutting off with a torch and cutting-off wheels we find the latter might pay in some cases where the cutting-off wheels will generate a flat surface that could not be had without extra machining.

Disk grinders are used to grind flat surfaces to exact dimensions and good finish. Both horizontal and vertical machines are used. Horizontal machines usually employ large disks where more than one casting can be ground at a time. Vertical machines are used for greater accuracy and sometimes for semi-automatic production work.

Use Disk Grinding

Foundries making automotive castings and those making radiators and sanitary ware use disk grinding extensively. To get the most out of these machines it is advisable to provide enough pressure and oscillation of the work being ground. Most of the grinding is done dry but coolant is sometimes used for greater efficiency. Silicon carbide grains are used in disks for grinding cast iron, brass and aluminum. Aluminum oxide grains are used for steel castings. The bonding material is mostly resinoid.

Of the more specialized foundries, the ones making large machine bases and other parts for heavy machinery usually do little grinding. However, some of the parts may have to be painted, and grinding with portable machines will produce a smoother surface on which it will be possible to do a good paint job.

Grinding stove tops is an old operation for which special machines have been developed. The assembled stove tops are fed automatically under a series of grinding wheels which traverse back and forth over the top. The first wheels are usually coarse, then finer wheels will take out the scratches, and polishing wheels set up with loose abrasive and glue will give the top a final polish. Fins and gates are used on floorstands using fairly hard silicon carbide wheels.

On some certain castings, such as high pressure valves and some turbine castings, it has been found necessary to have large feeders. Grinding wheels mount-

(*Continued on page 254*)

How TO MAKE AND KEEP HOT BACKING SAND CONSTANTLY WORKABLE

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"Marabond"

THE NEW TYPE ORGANIC BINDER PROVEN IN ACTUAL USE

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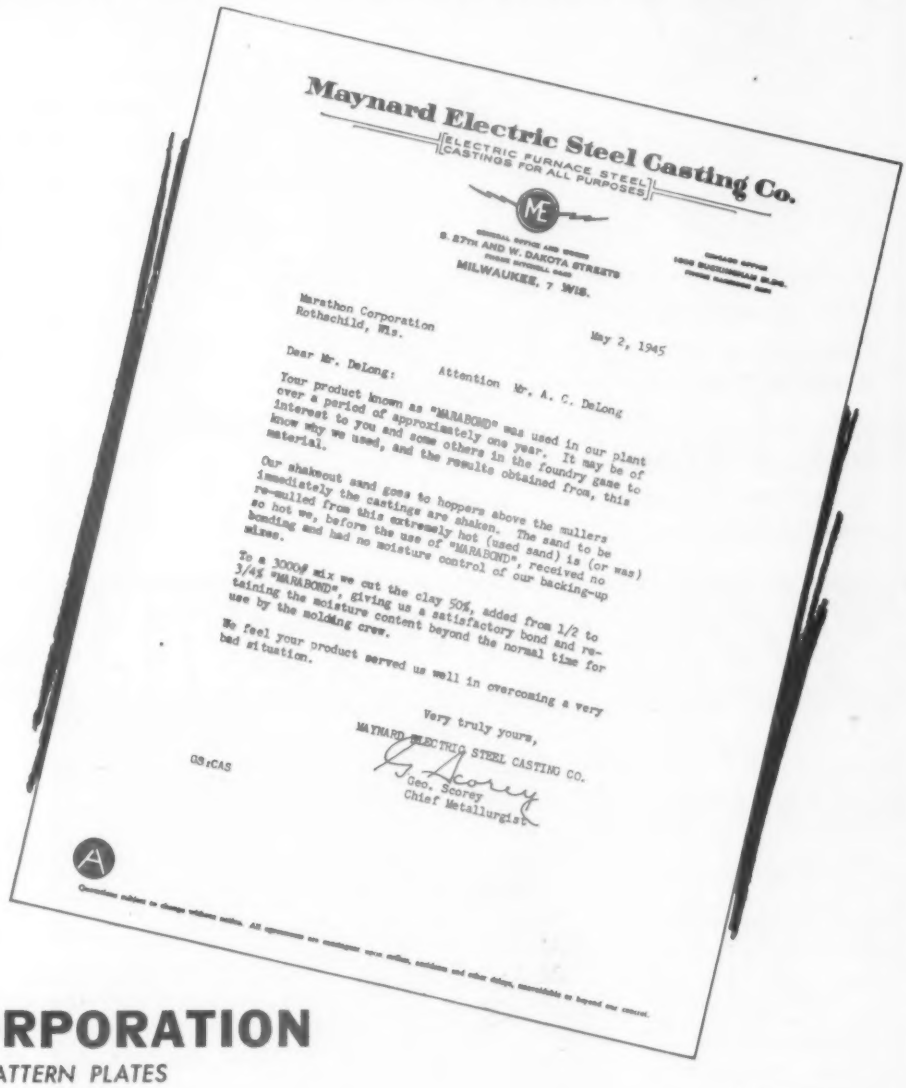

Maynard Electric Steel Casting Co.

ELECTRIC FURNACE STEEL CASTINGS FOR ALL PURPOSES

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Marathon Corporation
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May 2, 1945

Dear Mr. DeLong: Attention Mr. A. C. DeLong

Your product known as "MARABOND" was used in our plant over a period of approximately one year. It may be of interest to you and some others in the foundry game to know why we used, and the results obtained from, this material.

Our shakeout sand goes to hoppers above the mullers immediately the castings are shaken. The sand to be re-mulled from this extremely hot (used sand) is (or was) so hot we, before the use of "MARABOND", received no bonding and had no moisture control of our backing-up mixes.

To a 3000# mix we cut the clay 50%, added from 1/2 to 3/4% "MARABOND", giving us a satisfactory bond and retaining the moisture content beyond the normal time for use by the molding crew.

We feel your product served us well in overcoming a very bad situation.

Very truly yours,
MAYNARD ELECTRIC STEEL CASTING CO.
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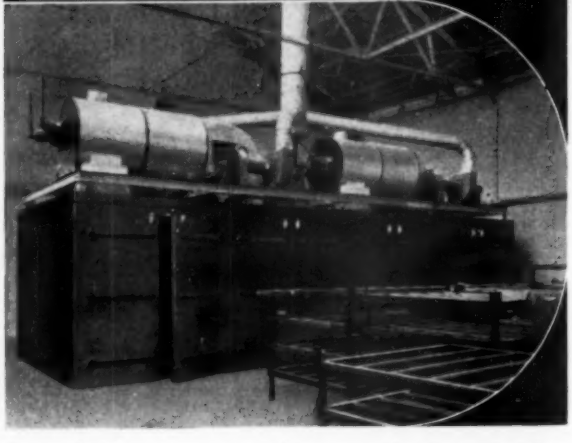
New FOUNDRY OVENS

REMODELING AND REPAIRS?



Reconversion to normal production will entail many changes.

In foundries it may require the repair of overworked ovens—the redesign of outdated equipment—the rearrangement of core and mold ovens—or their removal to new locations.

Lanly is in a position to render expert assistance in any service pertaining to ovens or furnaces for industrial uses.

Write for illustrated catalogs and consult us regarding any need that may arise.

THE LANLY CO.
OVENS FOR INDUSTRY
HEATED BY GAS, OIL, ELECTRICITY OR STEAM
750 PROSPECT AVENUE · CLEVELAND, OHIO

(*Continued from page* 252)

ed on swingframe machines are most practical to grind off the feeders and smooth out the castings. Swingframe machines are most practical when there is a large amount of material to be removed.

Cylinder blocks for automobiles and smaller diesel engines are ground on the exterior using high speed wheels on swingframe machines. The cylinder and some exterior places are ground with smaller wheels on portable grinders. The fins on cylinder heads are ground on floorstands using fairly coarse medium, hard silicon carbide wheels.

Cast iron pipe is also ground to remove fins so the ends will fit together. Some of the work on the outside is done with 6 or 8-inch wheels on portable grinders but a variety of special machines are used to grind the inside of the pipes. Sand spun pipes must all be ground internally to remove slag and smooth the surface. The wheels used for pipe grinding are usually quite a little harder than those used for ordinary cast iron.

As a general rule, it pays to keep the grinding wheels up to the highest permissible and safe speed as recommended by the wheelmakers. On floorstands where the wheels are kept up to speed, we do not expect any advantage using high speed wheels on plain cast iron.

On swingframe machines used for larger castings and heavy stock removal, high speed resinoid wheels have an advantage over the vitrified bonded that must be run at a slower speed.

Use Proper Speed

On portable grinders and flexible shaft machines, mostly resinoid bonded wheels are used. It is important not to use resinoid bonded at too slow speed as they then wear out too fast and it is equally important not to use vitrified bonded wheels at speeds higher than recommended.

To obtain the best work and most economical result from the grinding room, the grinding machines must be in good condition. The speed should be checked periodically and changed if necessary. The machines should have plenty of power to be sure they will not slow down under working pressures. Machines running too slow or with insufficient power will waste abrasive material and cause higher grinding costs.

This brings us to the question of what safety measures can be taken to protect the operators and we should like to offer a few suggestions.

The operation of all machinery is attended with risk. The same fundamental principles of safety which apply to other industrial operations, namely, protection of the operator by mechanical means and his education to observe the proper precautions, apply also to the use of grinding wheels.

The surface speed of wheels as used in ordinary practice approximates a mile a minute. Special precautions must be taken, therefore, first to prevent wheel

(*Continued on page* 256)

LONGER LASTING
lifting magnets
. . . built by Dings
Dings High Intensity Lifting Magnets last longer because of their rugged construction and the more than 40 years of experience back of their design. Every detail of construction has been improved to increase lifting power and structural strength: The coil spool is made of high permeability steel; there is a correctly proportioned balance of copper wire and steel to assure maximum lifting capacity with a minimum of weight and current input. Result: A powerful, longer lasting magnet . . . an ever growing list of enthusiastic users.
Dings builds a complete line of High Intensity lifting magnets in sizes from 18" to 65" diameter. Write today for Catalog No. 22.
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DINGS FEATURES:
Coil locked in place to prevent damage and short circuiting.
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Large structural fins give added strength and radiate heat.
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FOR INSPECTING CASTINGS
Alnico horseshoe magnet now being used with finely divided magnetic sprinklings to inspect castings for flaws. Very powerful. 2½" wide x 3" high. Pole bases ¾" x ¾".
Dings
"HIGH INTENSITY"

ALUMINUM EY-BARS

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BEST FOR STEEL

STANDARD SIZES

2-lb.	8-lb.
3-lb.	10-lb.
5-lb.	12-lb.

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CLEVELAND, OHIO

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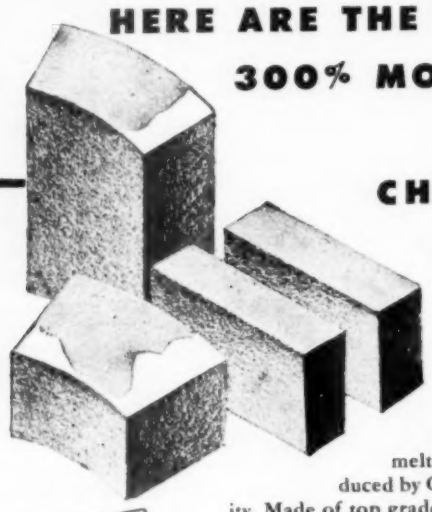


They proved, by actual production melting, that the blocks and bricks produced by Chicago Retort are superior in quality. Made of top grade Missouri clay and "*cross-grained*" by an exclusive, patented process, they give up to 50% longer life and reduce melting costs. Responsible also for this significant increase, in less than a decade, are the central location of our plant in Ottawa, Ill., and our shipping facilities, which enable mixed shipments of blocks and bricks with foundry clay to be forwarded as economically as straight carload purchases, by either rail or truck.

Save Time & Labor! Use **Chicago Retort's FITTED LADLE LININGS** *For Crane and Cylindrical Ladles. Shapes Designed To Fit All Standard Sizes*

ANTI FIRE CRACK PRODUCTS FLUX

CHICAGO RETORT & FIRE BRICK COMPANY

Manufacturers Since 1879

208 SOUTH LA SALLE STREET • CHICAGO 4, ILLINOIS

(*Continued from page* 254)

breakage and second, to guard the operator against injury.

Grinding machines should be designed for stability and rigidity to prevent vibration. The spindle end, nut, and flanges should be protected by properly designed hoods. In addition to the usual safety protection devices for belt guarding dry grinding machines should be provided with dust hoods connected with an exhaust system.

The greatest care should be taken in the mounting of a wheel. The hole in the wheel should be slightly larger than the spindle or arbor, so that the wheel does not need to be forced on.

Wheels always should be mounted with flanges made in accordance with the specifications laid down in the "Safety Code for the Use and Care of Abrasive Wheels," as adopted by abrasive wheel manufacturers.

The inner and outer flanges should be exactly the same diameter. They should run perfectly true and should be fixed to the spindle, and the hole in the outer flange should be an easy sliding fit on the spindle or arbor. Compressible washers, the diameter of which is not smaller than the flanges, should be fitted between the wheel and its flanges. The flange nut should be tightened only sufficiently to hold the wheel firmly, as excessive tightening is apt to cause damage to the wheel.

Surface Decreases with Wear

As the wheel wears down its surface decreases if the number of revolutions per minute remains unchanged. The common method of remedying this is either by the use of a cone pulley on the wheel spindle, or a series of machines with wheels running at different speeds.

Attention should be paid to the position of the work rest. It should be adjusted close to the wheel at all times, with a space of not over ⅛-inch between the two, thus preventing the work from slipping between the wheel and the rest. Work rests should not be adjusted while the wheel is in motion, and they should be rigidly clamped.

When a new wheel is started the operator should stand at one side until it has reached its full speed and has run for at least one minute. Work should never be forced against a cold wheel, but should be applied gradually, giving the wheel an opportunity to warm up evenly. In continuous operations care should be taken that the heat generated does not become so great as to cause breakage.

On dry grinding work, the grinding wheel operator should wear good strong and easy fitting goggles at all times. The grinding wheel itself should be safeguarded by one of the four approved types of protective devices, namely, hoods, flanges, chucks, or bands; preferably by a hood if it can be adopted.

Protection hoods consist of an enclosure for the grinding wheel and are designed to retain all fragments in case

(*Concluded on page* 258)

IT'S UP TO YOU TO HELP MAKE 2=3 WITH...

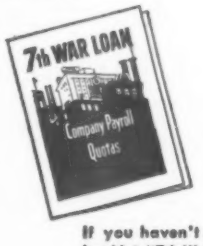
A job for seasoned executives—this 7th War Loan! Especially when we've got to make 2 war loans total just about as much as all 3 in 1944! Putting this over demands the combined and *continued* efforts of the "No. 1" men of American industry.

This means marshaling your plant drive to make every payday—from now 'til June 30th—do its share toward the success of the 7th. Directing the drive is not enough. It's equally important to check to see that your directions are being carried out—intelligently!

For example, has every employee had:

1. **an opportunity to see the new Treasury film, "Mr. and Mrs. America"?**
2. **a copy of "How To Get There," the new Finance Division booklet?**
3. **a new bond-holding envelope with explanation of its convenience?**
4. **7th War Loan posters prominently displayed in his or her department?**
5. **information on the department quota—and an urgent personal solicitation to do his or her share?**

Remember, meeting—and beating—your highest-yet 7th War Loan quota is a task calling for "No. 1" executive ability. Your full cooperation is needed to make a fine showing in the 7th! Do not hesitate to ask your local War Finance Chairman for any desired aid. It will be gladly and promptly given.



If you haven't a copy of this important booklet, "7th War Loan Company Quotas," get in touch immediately with your local War Finance Chairman.

The Treasury Department acknowledges with appreciation the publication of this message by

THE FOUNDRY

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A Short Cut to Increased Production

HUNTER FOUNDRY CO., CHICAGO REPORTS

500% INCREASE

With original equipment, gated pattern and hard match only 10 to 12 molds per day were possible. Through the use of TAMASTONE Pattern Compound (100 lbs.) the job is converted to separate cope (A) and drag (B) patterns and production is now 60 molds per day. This new method enables the foundry to draw pattern from the sand as offset parting, eliminating the amount of sand to be lifted in the cope. Equipment is gated for pouring manganese.

Savings from 300 to 500% are possible in your plant! Write for literature!

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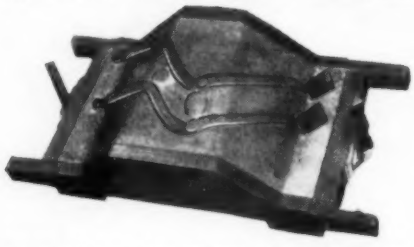
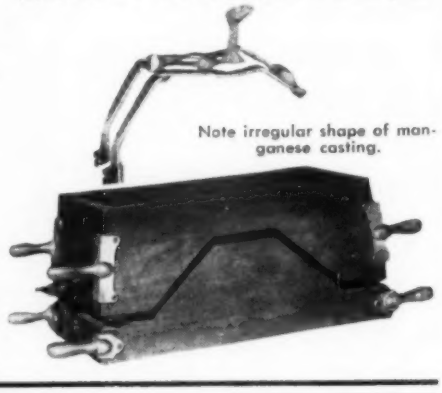
(A)—COPE is entirely made of TAMASTONE.



(B)—DRAG is of TAMASTONE with a metal gate.



Note irregular shape of manganese casting.

14" x 24" SLIP FLASK is designed to conform with extremely irregular parting line and manganese casting. Cope 11" high with 6" offset and 4" drag.

Expands as it dries!

QUICK DRYING

SHELTON METALLIC FILLER

HARD SETTING

A metallic cement that expands as it dries making a permanent surface patch on iron and steel castings. Proved best in 25 years of foundry service. Dark and light shades in one to 100 lb. containers. Free sample on request. *Manufactured by*

AMERICAN CRUCIBLE COMPANY

SHELTON, CONN.

(*Concluded from page 256*)

the wheel is broken. They provide as nearly absolute protection to the operator as is possible.

When a protection hood cannot be used, protection flanges should be employed. Tapered flanges are designed for use with wheels which are thicker at the hole than at the periphery. If a wheel breaks with flanges of this type, only those portions esape which are broken off outside the flange. Hence, as large flange as possible should be used and changed frequently as the wheel wears down.

Joint Iron Council Formed in London

As a result of discussions in Great Britain between producers of foundry pig iron and the Council of Ironfoundry Associations, a new body, titled the Joint Iron Council, has been formed in London. The new organization includes the Council of Iron Producers, an association which represents producers of pig iron other than iron for steelmaking purposes, and the Council of Ironfoundry Association, a confederation of the numerous iron founders' trade associations throughout the country.

One of the chief objects of the new council is to insure that full advantage be taken of the technical advances made during the past 5 years throughout the industry, which comprises some 1800 establishments. It is not intended that there be any interference with the autonomy of the various associations comprising the Council of Ironfoundry Associations. The constitution has been drawn as widely as possible, and it is proposed that in the near future a director will be appointed who will be the executive official of the federation.

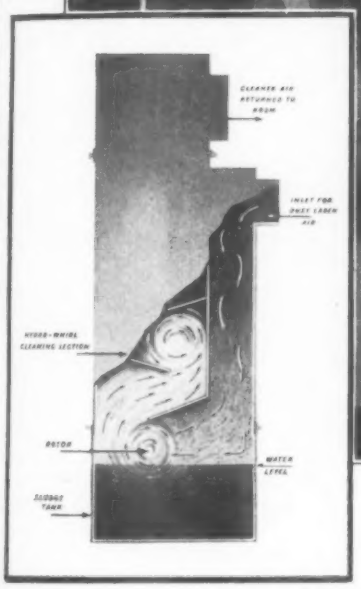
H. H. Berresford, managing director, Staveley Coal & Iron Co. Ltd., and present chairman of the Council of Iron Producers, has been named president of the new council and FitzHerbert Wright, chairman of the Council of Iron Foundry Associations, vice president. A council composed of ten representatives each from the two member councils has been appointed to assume management and control of the new organization.

National Carbon Co. Film Available

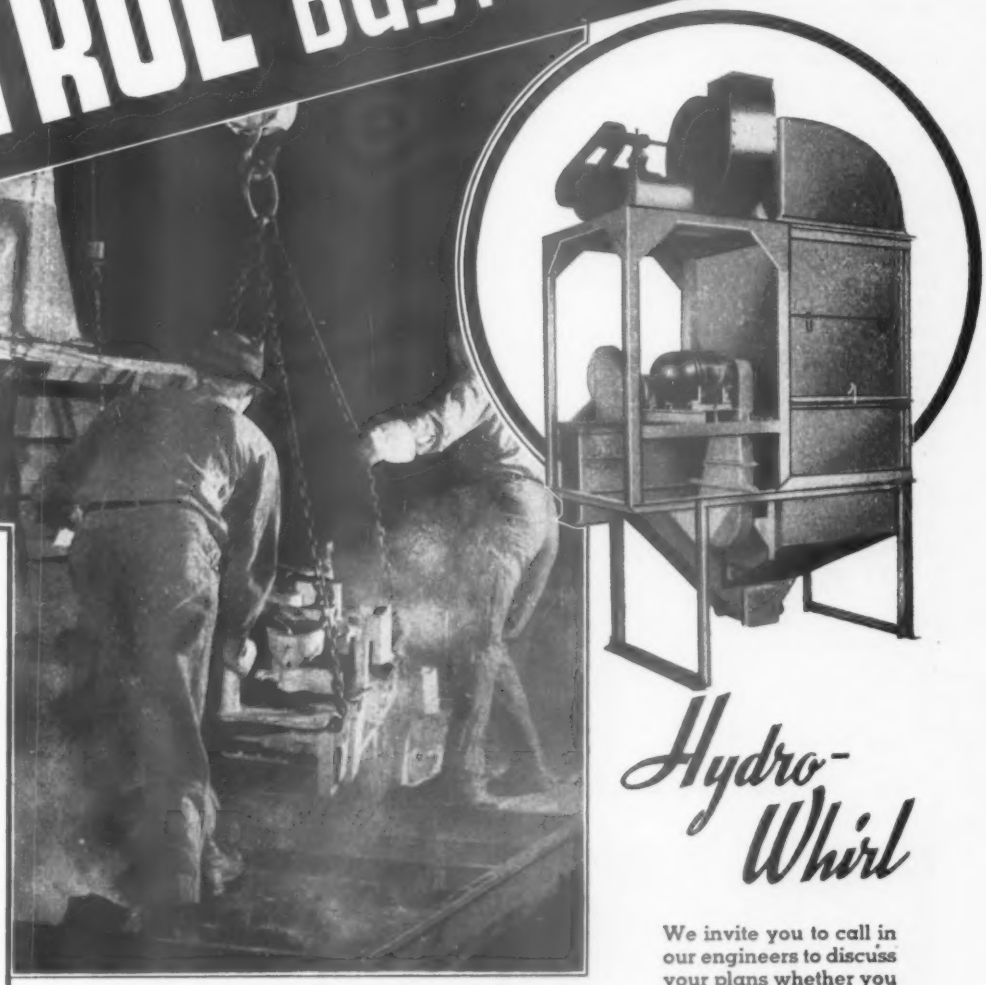
National Carbon Co., New York 17, has available for use by interested societies or groups an industrial movie entitled, "Carbon—Black Treasure." The 37-minute kodachrome sound film is a step-by-step presentation of the manufacture of electrodes and anodes for electrothermal and electrochemical applications, and covers the processing of carbon into electrodes and anodes from the selection of raw materials to end product use in electric furnace and electrolytic cells.

HYDRO-WHIRL

CONTROL Foundry DUST and FUMES



Cut-away cross section of the Hydro-Whirl shows air-cleaning action.



Hydro-Whirl

The new principle which Hydro-Whirl has brought to industry combines with the proved advantages of wet precipitation a radical departure from the conventional design.

The extraordinary performances of the Hydro-Whirl in the leading plants of the country have demonstrated that this development deserves first consideration where the collection and safe handling of practically all industrial dusts and fumes present a problem.

We invite you to call in our engineers to discuss your plans whether you contemplate a new plant or expect to reconvert your present one. We shall be glad to help you either in an advisory capacity or to help lay out a complete processing system.

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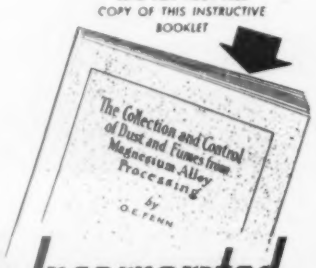

HYDRO-WHIRL

PETERS-DALTON Incorporated

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HYDRO-WHIRL DUST COLLECTORS AND SPRAY BOOTHS—INDUSTRIAL OVENS, WASHERS AND VENTILATING SYSTEMS

FOUNDRY FACING MATERIALS

(*Continued from page* 102)

has shown that a slight increase in the sintering point of the sand results when seacoal is added. Metcalf has stated that, whereas sand might not be sufficiently refractory for heavy section castings, addition of seacoal to the facing sand provides the needed resistance.

A simple calculation will show that the presence of seacoal would account for only a small effect on the sintering point of facing sand. Assume a facing sand containing 10 per cent by weight of seacoal having a 6 per cent ash content. If all the seacoal in the facing sand is reduced to ash, which we know is not true, then this ash is present in an amount equal to 10 per cent of 6 per cent, or 0.6 per cent. Such a small amount obviously would have little effect. As far as the seacoal ash building up in the sand is concerned, reclaimed shake-out sand will contain only a small fraction of 0.6 per cent depending upon the ratio of facing sand to total sand in the mold.

Another, and important, class of facings includes all types of protective coatings for cores and molds. Foundry technology contains few references to these materials and their use. For this reason, recommendations for the proper preparation and application of core and mold coatings should be of considerable interest.

It should be emphasized at the outset that core and mold coatings will not correct difficulties caused by improper or poor sand. They are intended to aid good, well selected sand in producing cleaner, smoother castings with better eye appeal and sales value.

It is not intended here to make specific recommendations of the type of coating material to be used on individual jobs, but rather to point out ways and means for getting the best performance possible from products now in use and to clarify characteristics.

Selection of core and mold coatings does not follow a formula, nor can they be tabulated exactly according to application. Experience of the manufacturer and intelligent testing in the foundry will indicate the best material to be used. Past experience in individual foundries has a great effect on the type of products used. It involves getting accustomed to the feel of a certain type material and its eccentricities. It sometimes means disagreement between men in two foundries, where conditions and work are similar, over the best material for a specific job.

The question as to whether a coating material shall be used at all can be answered by considering two points: First, if the desired casting finish cannot be obtained without the use of a coating, one must obviously be used, and second, in borderline cases, if the cost of the coating material and its application is less than the additional cost of cleaning a poorer casting and a value can be put on better looking castings, then it is economical to use a coating.

Core and mold coatings may function in three ways, by their heat resistance or refractoriness preventing fusion of sand to casting, by providing a surface smoother than the sand grain pattern and by sealing the sand surface against metal penetration.

Coating materials may have a graphite or other carbon base or they may be carbon-free and contain high fusion minerals. Carbon-base coatings, particularly those made with graphite, have the quality of heat-resistance, since the carbon is difficult to burn. The term refractory does not apply here because there is no question of melting point of graphite. Refractory materials include silica, aluminum oxide, zirconium oxides and silicates and mica.

Except for plumbago, most core and mold coatings contain a binder to insure adherence of the film to the sand and bentonite to keep the solid particles in suspension in water. The amount of binder depends upon the severity of the action of flowing metal in washing off the film.

Water is most commonly used to make a coating solution. If an organic solvent such as gasoline, naphtha or similar liquid is used several things must be borne in mind. The water-soluble binders usually used are not soluble in these liquids and will exhibit no adhesiveness. It is necessary to use an organic binder that is soluble in gasoline, naphtha, etc. Remember also that bentonite does not swell in any liquid besides water, therefore it will not keep particles in suspension in other liquids. If a solvent other than water is used, continuous agitation of the solution may be necessary. Some foundries purchase coating materials containing no binder. This allows for the varying addition of either water soluble or solvent soluble binder in amounts found necessary for different types of castings.

May Need Binder

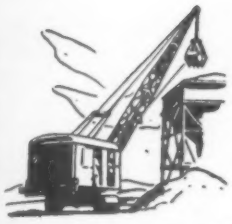
Many foundries have adopted the practice of adding other materials, such as silica, talc, plumbago, etc., to coating materials as purchased. Manufacturers of coating products incorporate sufficient binder and bentonite to take care of the other material present. However, if more than 10 to 15 per cent of other material is added, both the adherence and the suspension may be inadequate, necessitating the addition of more binder and bentonite.

In preparing a coating solution for use, a mechanical mixer is much better than hand mixing. It is faster and more thorough and it provides more uniformity from one batch to the next. A coating solution is never at its best until all lumps of powder have been broken up and all air is displaced with water or other liquid. Using a mechanical mixer, the batch will become smooth more quickly if it is mixed to a heavy consistency at first. Hold back one-quarter to one-third of the water until all lumps are broken up and then dilute to the desired consistency.

Coating materials high in bentonite tend to build up on standing and it will be observed that the specific gravities as determined by Baume readings are higher when the solution is tested over a

(*Continued on page* 262)

TEMPERATURE CONTROL: ***A new vacuum-tube thermocouple device, said to increase the sensitivity and response of conventional temperature controls by a thousand per cent, is shown in use by the inventor, M. J. Manjoine, research engineer, Westinghouse Research Laboratories. It consists of two thermocouples of different thermal capacity and an electric heating element, enclosed in an evacuated glass envelope. Changes in electric furnace temperatures are anticipated and corrective steps taken to minimize the cyclic swings in temperature characteristic of most furnace controls***



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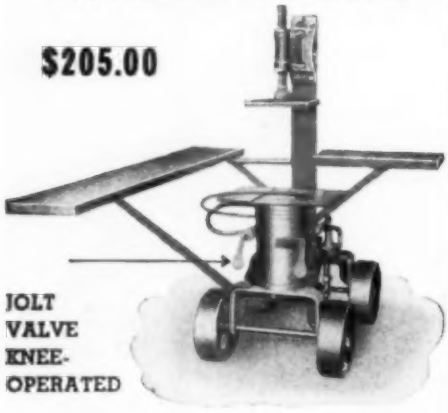

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PIONEER
MANUFACTURING CO.
Molding Machine Manufacturer for Over 20 Years
MILWAUKEE (West Allis) WISC

(*Continued from page 260*)

period of several hours. Some foundries mix to a heavy consistency and allow the material to stand over night, diluting the next morning. This practice is not possible in production shops. Where the mixer capacity is not sufficient to supply the solution required, it is suggested that the mixes be made 15 to 20 degrees Baume higher than the consistency at which the solution is used and diluted in the dip or spray tanks.

It is strongly recommended that all coating materials be tried at different Baumes until the desired film is obtained on cores or molds and the proper Baumes standardized. A troublesome variable can be eliminated if all batches are made up to the same consistency and are controlled by means of a Baume hydrometer. When using a hydrometer, be sure it is clean and dry. A wet hydrometer will not give a correct reading. Do not, in taking a reading, let go of the hydrometer so that it sinks rapidly into the solution, as the readings will be low. By keeping a very light grip on the stem a little practice will enable one to release it within 5 degrees of the correct reading.

Caused by Fungus

One difficulty frequently encountered in the use of coating solutions is fermentation, which tends to take place more rapidly in hot weather. This spoiling, with its accompanying foaming, is caused by a fungus which ferments the binder. Fortunately, there are chemicals which stop the action of the fungus. Cores dipped in a fermenting solution show numerous bubbles. When the coating is dried, the bubbles break and leave pock marks which give anything but a smooth casting surface. Careful storage of coating products and good housekeeping will eliminate this trouble. Do not store core wash and blacking, particularly if in bags, in a damp place. The sweating of steam pipes against which bags of core wash are piled can start the fermentation in the dry powder. Periodic scraping and washing of dip and spray tanks will prevent fermentation starting in the crust of material around the edges of the tanks.

Bentonite is probably the most critical material used in coating products. Varying its percentage has a pronounced effect on the nature of the coating film obtained. An excess of bentonite may cause a coating material to appear economical, since as little as 3 pounds of dry powder to one gallon of water might produce a solution having a Baume of 32 degrees, whereas 4½ pounds of another product may be required to give the same Baume. Used at the same Baume, the drag-out on the cores will be more in the case of the high bentonite product, but the film after drying will probably be about the same in thickness for both products. In one case about 50 per cent more water must be evaporated to dry the film and the results as far as satisfactory coating is concerned will show little difference. It takes heat to evaporate water and it takes time, so there is no economy argument here. The test of economy in comparing two coating products is not the number of pounds of dry powder required to make a solution of a given Baume, but rather the number of cores of the same size and shape or the number of square feet of core surface satisfactorily coated by 100 pounds of dry core wash.

It is obvious, of course, that sufficient bentonite should be present in a coating material to keep the particles in suspension for at least several hours at the desired Baume. Some applications seem to require a low bentonite coating material and the tendency toward settling may necessitate agitation of the solution. Mechanical stirring is preferable to air bubbling because it does not inject air into the solution to appear on the core surface as bubbles. Where air agitation is used it is advisable to put an oil trap in the air line to prevent oily contamination of the solution surface.

The proper Baume at which to use a coating solution is best determined by trial. Although in general thin solutions are used for spray coating, medium solutions are applied by dipping and heavy solutions are brushed on, no specific recommendations can be made, since the range of Baumes for each method of application is wide. A coating material should be selected that gives the desired film thickness, yet has the least tendency to form "runs," "tears" or build up at the bottom edges of dipped cores.

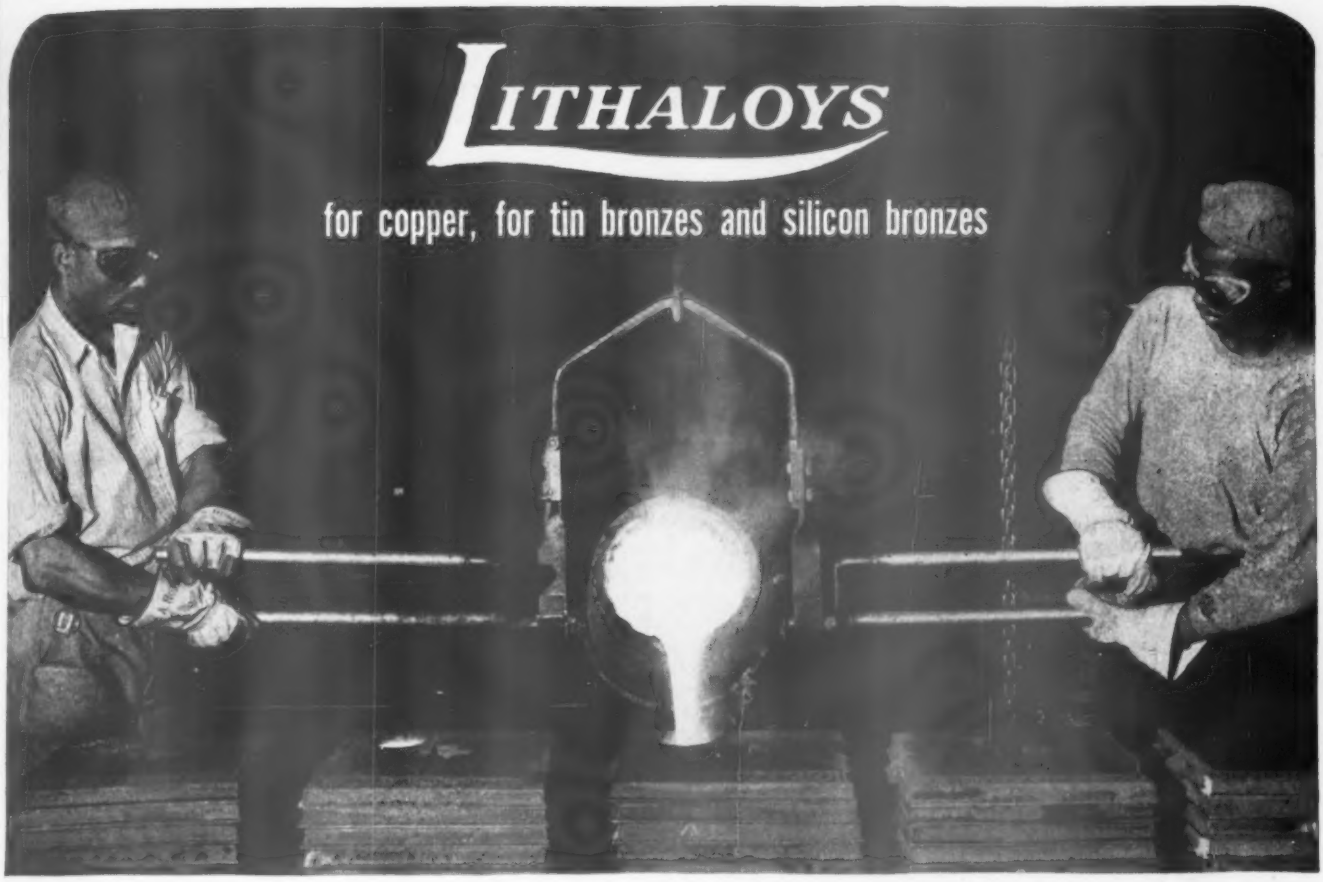
Penetration Is Influenced

Of considerable importance is the nature of the film of coating material on cores and molds. Where casting sections are heavy and the coating is subjected to heat for longer periods of time than in the case of light section castings, the coating should penetrate deeper into the sand, and should also form a thicker surface film. Several factors affect the depth of penetration. Spraying and brushing naturally force the solution deeper than does dipping. Coating solution will penetrate open sand deeper than it will fine, tight sand. Due to the fact that unbaked core oil repels water, a water base coating will not penetrate a green oil-bonded core as deeply as it will a baked core. In the latter case the baked oil is easier to wet and the penetration will be deeper. This difference is sufficient to make it advisable to use different coating products for green core coating than for dry cores. Penetration can always be increased by adding small amounts of wetting agent to the coating solution.

Some control over the balance between depth of penetration and thickness of surface film is possible by varying the Baume at which the solution is applied. However, it is preferable to call on the coating manufacturer to supply the proper material with this characteristic properly balanced.

Coating materials containing binder will give off gas when metal is poured.

(*Concluded on page 264*)



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(*Concluded from page 262*)

It is therefore usually desirable that the coating be somewhat permeable to allow for venting off this gas. However, it has been claimed that gas from the coating acts in a similar manner to the gas from seacoal and actually aids in producing a smoother casting surface. Soft texture coatings appear to be better than those that are smooth to the point of being slick, since metal will lie against such a surface more quietly, with less turbulence. It is also claimed that the graphite in coating materials can graphitize the surface of iron castings, making hard iron soft and soft iron spongy. It is certainly true that graphite is a much better heat conductor than sand, so that graphite base coatings probably exhibit a chilling action on metal.

There are a number of methods of drying core and mold coatings, oven drying being the method most commonly used, particularly for cores. A saving in drying time can be effected by coating cores while they are hot, providing the cores are chunky enough to contain sufficient residual heat. Care must be taken that the cores are not hotter than 200 degrees when coated. Any temperature above 212 will boil the water in the coating and a rough surface will result.

Do Not Overheat Surface

Molds are skin dried either by passing them, on a conveyor, under a swinging bank of gas flames or by means of a hand operated torch. When drying by hand torch, the operator must be careful not to overheat the surface, particularly at corners, because of the danger of burning the binder out of the coating. Metal has more tendency to wash at corners than along flat surfaces and can easily dislodge coating whose adherence is weakened.

Several foundries have had good results from skin-drying molds before spraying on the coating. It is claimed that time is saved, since the water in the coating solution does not get a chance to soak into the sand when it is hot. Within the last few years banks of infra-red lamps have been used to dry core and mold coatings. Some foundries mix coating material with an inflammable solvent and after the core or mold is sprayed ignite the solvent. The heat of the flame dries the surface. Others dry large molds by building charcoal fires on metal plates supported above the sand surface.

Although much of the preceding discussion applies also to plumbago, it should be borne in mind that practically all plumbagos are made without binder or bentonite. When used on green sand in the dry form they depend for adherence upon the moisture and clay in the sand. When used wet, molasses water can be added for adherence and bentonite for suspension.

To illustrate the diversity of materials used for coating cores and molds, here are a few specific examples:

1. Some foundrymen claim that aluminum alloy castings made in metal molds have a better skin if the molds are not coated. Others use whiting mixed with water and bonded with silicate of soda. Silicate of soda used as a binder has the advantage that it does not produce gas when castings are poured.

2. Die molds are reported to be preheated and sprayed with clay wash, bonded with silicate of soda.

3. Cement bonded molds may be coated with refractory materials such as zirconium oxide or silicate, aluminum oxide or mica, bonded with cement.

4. Carbon deposit from any oxyacetylene flame is used as a coating on molds made from sand or metal.

5. Where flour is used on molds for brass, its adherence is said to be improved if the mold is sprayed lightly with molasses water.

6. For metals which tend to seep into cores, the cores can be rubbed with a paste made by mixing plumbago with core oil.

7. Graphite coatings should not be used on cores and molds for castings that are to be enamelled. A graphite film remaining on the casting surface, even after sand blasting, weakens the adherence of the enamel.

8. Chills are coated with mineral oil alone, or mixed with iron oxide, talc, etc. Chills must be clean, dry and free from rust. Since moisture will condense on cold chills, they are frequently preheated before being rammed up in the mold.

Gives Important Points

To summarize:

1. Use seacoal having a fineness number close to that of the sand in which it is mixed.

2. Do not expect core and mold coatings to correct poor sand.

3. Mix coating solutions thoroughly in a mechanical mixer and use water with those products compounded to be used with water.

4. Use additional binder and bentonite if more than 10 to 15 per cent of other materials are added to coating products as purchased.

5. Standardize solution Baumes and control all mixes with a hydrometer.

6. Practice good housekeeping to prevent trouble from fermenting solutions.

7. Use care in torch drying molds to prevent burning the binder out of the coating.

8. Let the core and mold wash manufacturer make recommendations based on a study of operating practice and required casting finish. He has experience in scores of foundries and also has at his disposal a number of raw materials that can be combined to produce any set of coating characteristics.

Core and mold coatings, when properly used, are excellent aids to the production of sounder, better looking, more easily machined castings.

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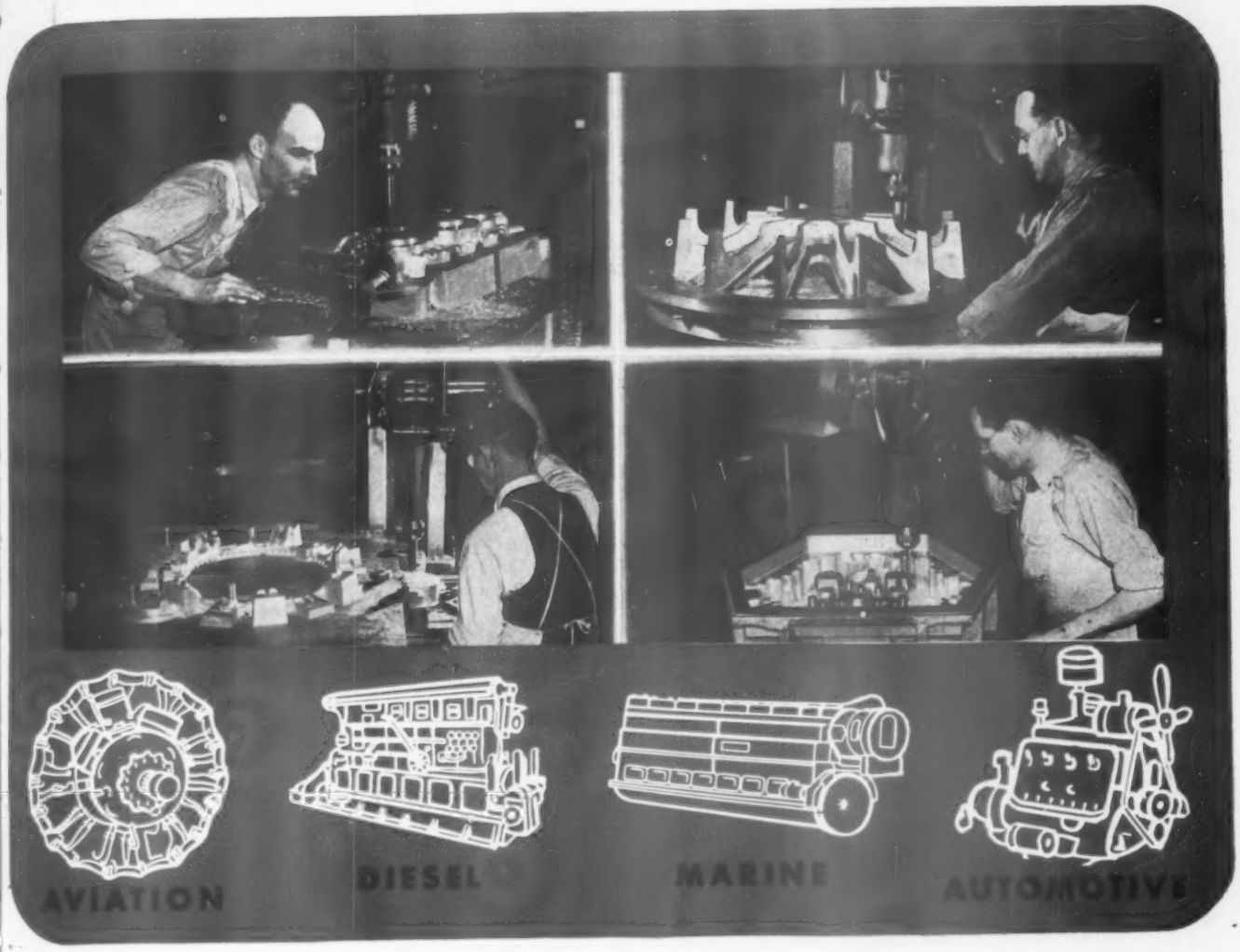

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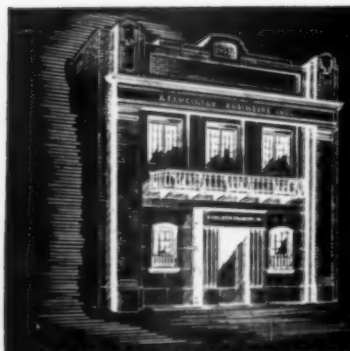

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AEI

INJURIES AND ACCIDENT CAUSES

(*Continued from page* 109)

be required to see that proper space is provided for the operation and that adequate teams or proper mechanical lifting equipment are available.

Defective agencies—The general need for more adequate inspection and immediate repair or replacement of imperfect equipment, tools, and materials was strongly indicated by the fact that over 10 per cent of the analyzed accidents in each of the three foundry groups involved defective material or equipment.

Defective hand tools, such as shovels with loose or split handles, hammers, with loose heads, and chipping hammers with loose chisels were particularly common sources of injury which could have been eliminated very readily through regular tool inspection and repair.

Uneven or broken flooring resulted in many slips and falls and caused many wheelbarrows and hand trucks to tilt and spill their contents. These conditions are particularly dangerous in foundries, since the workers frequently carry heavy materials or molten metal which can inflict severe injuries if they are dropped or spilled as a result of a slip or fall. Such hazards generally are quite obvious and are seldom difficult to repair. Their continued existence is very definitely an indication of slack supervision.

Inspection Not Adequate

Other defective agencies, which caused fewer but nevertheless substantial numbers of accidents, included defective molds which broke in pouring, defective chains, cables, and sheaves which caused crane loads to spill on workers, defective ladders and scaffolds which caused serious falls, and defective electrical equipment and wiring which caused electric shocks and burns. Nearly all of these unsafe conditions were such that they should have been noticed in the course of a normal inspection. The fact that they were permitted to exist until they caused accidents indicates that adequate inspections were not made.

Unguarded agencies—About 7 per cent of the injuries in the gray iron and malleable iron foundries and over 8 per cent of those in the steel foundries were directly related to the absence of needed guards. Considerable numbers of these were due to the lack of guard rails around openings or at the edge of elevated walkways or working surfaces. The majority, however, were cases of unguarded machines or mechanical equipment.

Stationary grinders, power saws, jointers, punch presses, drill presses, and sanders were frequently listed as causing injuries because there were no guards at the point of operation. Open gears, open belts, and unfenced conveyers also were responsible for a number of injuries. Inadequate guards, which by their presence instilled a false sense of security, contributed to the occurrence of many injuries. In this connection it should be emphasized that machine guards are sometimes designed merely to meet minimum state requirements or for appearance to promote the sale of the machines without regard for the extra protection which could be incorporated into the design at slight additional cost.

Unsafe Personal Acts—For the purpose of accident analysis an unsafe act is defined by the American Standards Association as "a violation of a commonly accepted safe procedure." Literally, this definition means that no personal action shall be designated as unsafe unless there was a reasonable and less hazardous alternative method of procedure. There is, however, no implication that the alternative safe procedure must have been known to the person who acted in an unsafe manner, nor that his unsafe act was the result of a considered choice between the two possible procedures.

In many instances, such as that of the grinder who elects to do a small grinding job without his goggles rather than take the time to go get them from his locker, it is apparent that the worker knew the safe procedure, but consciously decided not to follow it. In a great many other instances, however, it is apparent from the circumstances that the person who acted unsafely did so not as a matter of choice, but simply because he did not know an alternative safe method. Strict safety-minded supervision is essential to eliminate this type of unsafe act. Thorough safety training for both workers and supervisors can do much to abolish unsafe acts which are committed unknowingly.

Fall in Four Groups

The great majority of the accidents analyzed in each of the three types of foundries involved one of four general groups of unsafe acts: (1) Using unsafe equipment or using equipment unsafely; (2) taking an unsafe position or posture; (3) failure to use safe attire or personal safety equipment; and (4) unsafe lifting. Together these four groups of unsafe acts contributed to 93 per cent of the accidents for which details were available in the malleable iron foundries, 87 per cent of the gray iron foundry accidents, and 83 per cent of the steel foundry accidents. The fundamental approach to the elimination of unsafe personal acts in foundries, therefore, must stress measures to:

1. Provide training in the safe methods of handling and using tools, materials, and equipment, and enforce the use of these methods through close supervision.
2. Train both workers and supervisors to recognize and to avoid unsafe positions.
3. Make sure that both workers and supervisors understand and can recognize the circumstances in which different kinds of safety equipment are necessary, and that the supervisors require the use of such equipment in those circumstances.
4. Provide thorough instruction in the

(*Continued on page* 268)

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(*Continued from page 266*)

proper methods of lifting heavy objects, particularly in the proper method of lifting with the legs instead of the back, and have the supervisors continue to emphasize such instructions during actual operations.

Use of unsafe equipment or unsafe use of equipment—The unsafe acts of this general group were factors in the occurrence of over 28 per cent of the steel foundry injuries and of about 23 per cent of the gray iron and malleable iron foundry accidents. The outstanding type of unsafe act in this group was the simple one of taking an incorrect hold or not maintaining a good grip upon objects being handled. Specifically, these included many cases in which materials or tools slipped from the worker's hands because there was oil or grease on the material or on his hands; or because the worker grasped the material at a sharp or rough spot which caused him to release his grip; or simply because the material or tool was not held firmly enough to control its movements. Particularly dangerous was the practice of using hands or feet to guide suspended crane loads into position or to adjust the chains holding the loads instead of using taglines or poles. Pinched and crushed fingers or feet were the most common injuries resulting from these practices.

Lack of skill and the lack of a full realization of the hazards involved in handling heavy materials undoubtedly had much to do with the occurrence of these accidents. Wider use of safety shoes would greatly reduce the resulting volume of foot and toe injuries. Elimination of the unsafe acts and prevention of the actual accidents, however, can be achieved only by thorough training in safe procedures and close supervision of individual operations by safety-conscious supervisors.

Unsafe position or posture—In 23 per cent of the steel foundry accidents, 13 per cent of the gray iron foundry accidents, and 10 per cent of the malleable iron foundry accidents, it was found that the injured person had unnecessarily placed himself in an unsafe position or posture.

Most prominent of the specific unsafe acts in this general group was that of unnecessarily working or standing under or in the path of cranes, hoists, and suspended loads. Other unsafe acts in this group included working, standing, or walking in front of moving vehicles; unnecessarily working or walking too close to other workers who were performing hazardous operations such as carrying or pouring molten metal; walking, standing, or working on beams, girders, piled materials, or makeshift scaffolds, instead of using proper ladders or scaffolds; taking short-cuts instead of using the provided walkways; and working in cramped positions. Most of these practices can be overcome through intensified safety instruction and better supervision.

Failure to wear safe attire or personal safety equipment—About 30 per cent of the gray iron foundry accidents, 28 per cent of the malleable iron foundry accidents, and 20 per cent of the steel foundry accidents were directly associated with the failure to wear safe clothing or proper personal safety equipment.

The cases involving failure to wear safe clothing included workers who wore loose clothing which caught on projections or was caught in machines or in sling chains; workers who wore cuffed or frayed trousers, which tripped them; and workers who wore shoes with worn soles which permitted puncture wounds and burned feet. In the aggregate, however, the failure to wear safe clothing was of much less importance than was the failure to use proper personal safety equipment.

Primarily, the cases of failure to wear proper personal safety equipment consisted of the failure to use goggles while grinding, chipping, sandblasting, or handling chemicals or molten metal; to wear gloves, leggings, and molder's shoes while pouring molten metal; and to wear gloves while handling hot molds or castings. In all of the analyzed cases included in this category the necessary safety equipment was available on the premises, but for one reason or another was not being used.

Enforce the Rules

It is obvious from these data that the plant which simply provides the various necessary items of personal safety equipment and invites the employes to use them has only partially solved the problem of overcoming the hazards which this equipment can guard against, nor does the issuance of shop rules requiring its use accomplish the purpose unless those rules are strictly enforced. The two most common excuses for not using the provided safety equipment were that it was uncomfortable and that it hampered the user's activities. Particularly in respect to the use of goggles considerable objection was raised because of the tendency of goggles to "fog" when the wearers were working with hot metal. This condition can generally be overcome easily through the application of "anti-fog" chemicals to the goggles. These chemicals are available commercially in a variety of forms. In other cases the excuse was that the safety equipment was not conveniently at hand and the workers felt that it was not worth the time and effort to go for it. In still other instances it was apparent that the employe did not realize his need for the equipment. A common example of the latter group of cases was that of the laborers who move material into and out of grinding rooms or sandblast rooms without wearing goggles. Many of these workers failed to appreciate the fact that every one who approaches such operations is exposed to flying particles just as are the actual operators.

When both supervisors and workmen have been fully instructed in the need for safety equipment, and the equipment is available, there can be no question as to their joint responsibility for any injuries which occur because the equipment was not used. Management, how-

(*Continued on page 270*)

. . . and on the home-front

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(*Continued from page 268*)

ever, can establish and maintain a definite program concerning the use of safety equipment. Such a program should include, as a minimum, the following measures:

1. Maintenance at convenient locations of an adequate supply of safety equipment which has been selected with due consideration not only for its effectiveness but also for the ease and comfort of the worker who must wear it.

2. Maintenance of every piece of safety equipment in good condition and making sure that it is properly fitted to the wearer.

3. Making sure that all supervisors and workmen are fully acquainted with the hazards which require the use of safety equipment and that they are familiar with the type of equipment needed in each instance.

4. Establishment of rules requiring the use of safety equipment where it is necessary and requiring supervisors to prohibit the performance of hazardous operations unless the proper safety equipment is used.

Unsafe lifting—Injuries resulting from manual lifting of heavy objects present a serious problem in foundries. In essence, every accident of this type is a case of lifting excessive weight—that is, excessive under the existing circumstances for the individual involved. Variations in the strength and skill of different individuals, however, make the determination of what is a safe maximum weight to be lifted by one person very difficult if not impossible.

Proper Lifting Procedure

There can be no question that a knowledge of and the strict application of proper lifting procedure—e. g., lifting with the legs instead of with the back—will render safe the handling of much greater weights than can be safely lifted by the hit-or-miss method of grabbing and jerking. In classifying the lifting accidents, an effort was made to exclude from this unsafe-act classification those cases in which individuals attempted to lift weights which obviously should have been handled mechanically or by a team. As far as possible, the cases included represent injuries which resulted from lifting weights generally handled by individual foundrymen and normally considered to be within the lifting ability of most workers. These cases represented 31 per cent of the accidents analyzed in the malleable iron foundries, 20 per cent of those in the gray iron foundries, and 11 per cent of the steel foundry accidents.

It is frequently impossible to specify exactly what was done incorrectly in certain lifting accidents. In most cases the injured person can report only that he was lifting and suddenly felt pain, and only rarely is there a witness who was observing the operation with sufficient care to identify accurately the specific faulty procedure. It is well known, however, that strains, sprains, and hernias frequently result from lifting with the back muscles instead of the leg muscles, from lifting in cramped or awkward positions, or from lifting while standing on irregular or insecure surfaces.

The complete elimination of manual lifting, which would avoid all accidents of this type, is an impossible goal, but many foundries could do much to reduce the volume of lifting accidents by extending the use of mechanical handling equipment and by giving all employees thorough training in the safe methods of manual lifting.

Safety codes and safety services—Foundry managements which desire to inaugurate or to improve existing safety activities within their plants will find that there is available a considerable volume of accident data and safety information. This helpful information is available from both private and governmental agencies.

At least ten trade associations and one professional association are active in the foundry industry, representing a combined membership of about 1100 companies in the trade associations and about 7300 individuals in the professional association. The trade associations from time to time distribute safety information to their members, but as a rule are not engaged in any continuing safety programs. The American Foundrymen's Association, on the other hand, has a permanent committee to consider safety and hygiene problems and has developed a comprehensive safety code for foundry operations, entitled "Recommended Good Safety Practices for the Protection of Workers in Foundries." Other related publications of this association include: "Code of Recommended Good Practices for Testing and Measuring Air Flow in Exhaust Systems"; "Code and Handbook on the Fundamentals of Design, Construction, Operations, and Maintenance of Exhaust Systems"; "Code of Recommended Practices for Grinding, Polishing, and Buffing Equipment Sanitation"; and "Code of Recommended Good Practices for Metal Cleaning Sanitation."

Safety Codes Available

In the National Safety Council the study and dissemination of information concerning safety in foundries constitutes an important part of the work of the Metals Section. Many foundry safety problems and their solutions are covered in the publications of the council, particularly in its Safe Practices pamphlets.

Several safety codes which apply directly to foundry operations have been developed under the auspices of the American Standards Association and have been issued with the approval of the association as "American Standards." The most pertinent of these codes is the "Safety Code for Industrial Workers in Foundries," approved by the association in 1932. Some of the other codes approved by the association which are applicable to particular phases of foundry operations are: "Safety Code for Floor and Wall Openings, Railings, and Toe Boards;" "Safety Code for Elevators,

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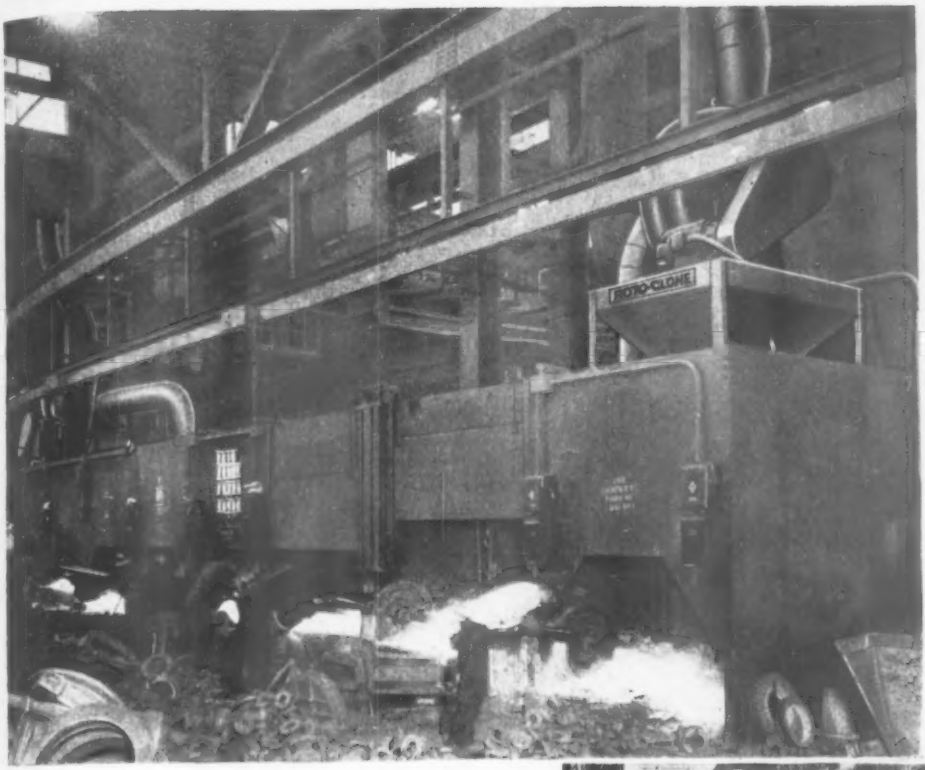

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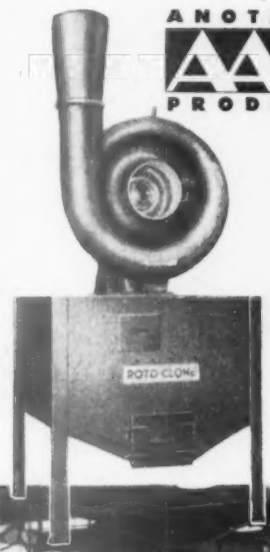

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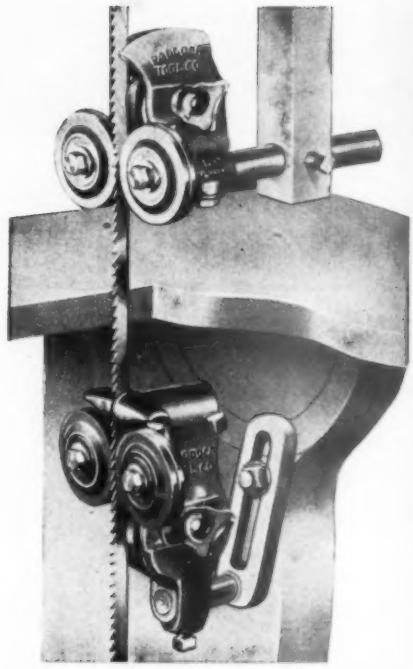

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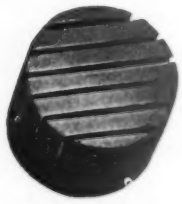

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(*Concluded from page 270*)

Dumb-waiters, and Escalators;" "Safety Code for the Use, Care, and Protection of Abrasive Wheels;" "National Electrical Safety Code;" "Safety Code for Woodworking Plants;" and "Protection of Heads, Eyes, and Respiratory Organs."

Governmental activities—A number of the industrial states have established safety codes for foundries and have provided for plant inspections for the enforcement of these code requirements. The majority of these are special codes prepared by the individual states so that there is considerable variation among them. Other states which do not have specific foundry codes frequently have incorporated references to foundries into their laws or regulations relating to industrial sanitation or to the employment of women and children. Because the state safety requirements are regulatory provisions they generally should be considered as absolute minima rather than as constituting the basis of a fully satisfactory safety program. In most instances, however, the state inspection services are in a position to provide safety advice and assistance beyond the scope of the legal requirements.

Injuries Regularly Compiled

In the federal government, statistical data concerning the occurrence of disabling injuries are regularly compiled and published by the Bureau of Labor Statistics. These data furnish a basis with which individual foundries may compare their own records to determine whether their accident rates are better or worse than the average for all foundries.

Also in the U. S. Department of Labor, the Division of Labor Standards co-operates with the states and with private associations in the development of new safety standards, and through the Committee for the Conservation of Manpower in War Industries offers free consultative service on safety matters to any plant which requests such service. Both the Division of Labor Standards and the Bureau of Labor Statistics regularly participate in the safety code activities of the American Standards Association.

In the U. S. Department of Commerce, the National Bureau of Standards conducts extensive research in the field of safety, and has played a leading part in the development of a number of recommended codes of safe practice which are directly applicable to foundry operations. Valuable information may also be secured from the U. S. Public Health Service, which conducts many studies in the field of industrial hygiene, particularly in respect to the methods of overcoming unsafe operating conditions which may produce dermatitis or other types of industrial disease.

Takes New Office

Philadelphia office of Mine Safety Appliances Co., Pittsburgh, is now located at 5564 Baltimore avenue, Philadelphia 43.

MAGNETIC INSPECTION OF CASTINGS

(*Continued from page 107*)

when the metal is tapped into an incompletely dried ladle.

Steel which has not been correctly oxidized during melting may contain dissolved hydrogen. When this molten metal comes into contact with a green sand mold the steam formed may initiate the expulsion of the dissolved hydrogen which takes the form of a pin hole porosity or worm holes.

Blows caused by molten metal coming into contact with wet molds may inject gases into the metal.

Gas porosity consists usually of a number of almost perfectly rounded, and sharply defined cavities usually occurring near the surface, but may extend throughout the casting section. No special difficulty should be experienced in locating by magnetic inspection gas porosity which lies sufficiently near the surface.

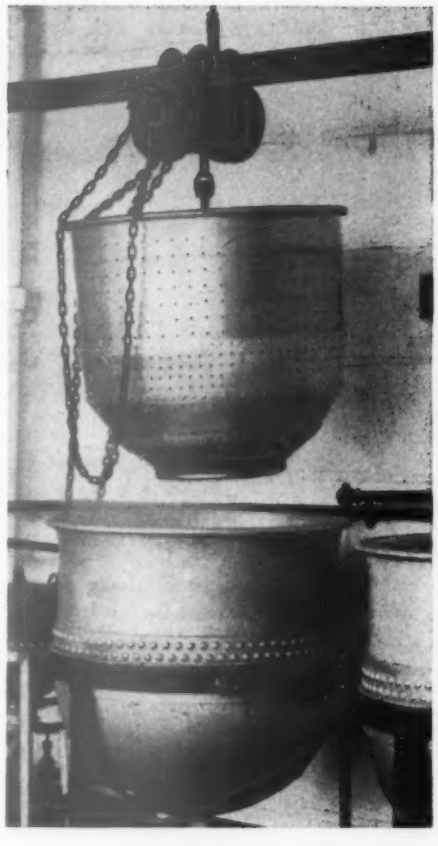
Hot tears—A true hot tear is caused by resistance to free shrinkage of the casting at a time when the metal has just solidified and has little or no strength or ductility. Resistance to shrinkage may be caused by hard cores, cores which are too heavily rodded, the excessive use of gaggers in the mold, by the use of a sand with too high a hot strength—in fact, anything which tends to resist free movement of the cooling casting. Although hot tears are often difficult to find by visual inspection, it is probable that all of them reach the surface at some point and are, therefore, capable of being easily found by magnetic inspection, producing an extremely sharp pattern even though the defects themselves may not be visible to the eye.

A hot tear usually appears as a series of cracks which run in the same general direction, each crack of the series being very slightly offset from its neighbor (see Figs. 2 and 3).

Cracks—Cracks form when the casting is at a temperature considerably below that at which hot tears form and probably result from stresses set up in the casting when it is in the brittle range. If they are formed when the casting is cold they are usually straight or smoothly curved, but if formed at temperatures slightly below the tearing temperature they may show a tendency to follow the grain boundaries and hence have a rather ragged appearance similar to that of hot tears; in fact, hot tears are probably merely a series of such hot cracks in the casting.

Surfaces of castings often have a fine network of cracks, the formation of which has not been explained satisfactorily.

Cracks, being surface defects, are easily identified by magnetic inspection but may be missed entirely by radiography.



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Shrinkage—Shrinkage is an internal defect resulting from incomplete feeding of the solidifying area and hence is usually limited to the heavier sections which are the last to solidify. Such shrinkage may take the form of a rather smooth walled cavity. On the other hand the cavity may be extremely ragged and appear almost to the surface (see Fig. 3). Centerline shrinkage occurs at the thermal centerline of nearly uniform sections and usually takes the form of a fine network of channels which are easily found by radiography but are often almost invisible when chipping (see Fig. 1 on page 104).

As massive shrinkage is a deep-seated defect it is doubtful if magnetic inspection would determine its presence except in those cases where accompanying tears or cracks approach the surface. In any case, the magnetic indication may be of such shape that its correct interpretation is difficult or impossible (see Fig. 1). Except in very thin sections, centerline shrinkage would probably show no indications unless combined with massive shrinkage having ragged walls which reach the surface.

Chaplets and internal chills—Although chaplets can usually be avoided by providing other more certain means for support of cores, they are sometimes necessary. Unless the chaplet is absolutely clean when placed in the mold and the mold poured immediately upon closing, the chances are that some points will exist which are unfused, thus increasing the tendency to leakage under high pressure. The same is true of internal chills. As chills are used in heavy sections to prevent shrinkage and are usually present to a greater extent than are chaplets, the tendency to leakage is correspondingly greater. It is often impossible to feed these heavy sections sufficiently to avoid shrinkage, hence the use of internal chills which is often carried to excess. In those cases where such feeding is impracticable, suitable external chills can usually be provided which will give the required cooling effect to eliminate shrinkage without the difficulties which are likely ot result from the use of internal chills.

Because of the difficulty which has been experienced in the past due to leakage around unfused chaplets and chills Navy specifications require that all such be radiographed. It has been shown by Ffield (Paul Ffield "Conditioning of Steel Castings to Standards of Quality", A.F.A. *Transactions* Vol. 52, No. 1 September, 1944, p. 173) (see also Figs. 6, 7 and 8) that unfused chaplets are indicated by magnetic inspection. It should be borne in mind, however, that chaplets and chills are usually of lower carbon content than the surrounding metal and may give magnetic powder indications even though complete fusion exists. Because of the difficulty experienced, some foundries making castings subjected to pressure have found it to be more economical to drill out all chaplets and chills and weld up the cavity rather than to depend upon either radiography or magnetic inspection to locate unfused areas.

Magnetic powder procedure—In general the procedure for magnetic powder inspection consists of passing an electric current through the part in a direction roughly parallel to the defect. The prod method is used in the majority of cases for medium and large castings. The electric cables carrying the current are attached to copper or other suitable rods equipped with insulated handles, these rods being pressed by hand into contact with the part to be tested thus permitting a continuous flow of current. With low carbon steels, in which the magnetic retentivity is slight, the current flow is continued while magnetic powder is dusted on the area between the prods. With the current still flowing the excess powder is gently blown off.

Where a defect or discontinuity which will cause magnetic flux leakage is present, the powder will build up at this point, indicating the exact point of leakage. If the metallic discontinuity is at or near the surface, the indication will be sharp and show the actual shape and size of the defect. As the depth of the defect under the surface increases, the indication will become progressively more diffuse and below a certain distance will disappear altogether.

Current Parallels Defect

Ordinarily a current of 300 to 500 amperes with a prod spacing of 6 to 8 inches is sufficient to produce satisfactory indications of defects located within $\frac{3}{8}$-inches of the surface. In certain cases, it may be necessary to increase the current, but higher currents may produce indications other than those of actual defects and which may be interpreted as defects in the casting (see Fig. 9).

Although the current should flow in a direction approximately paralleling the defect, satisfactory indications should be obtained if the angle subtended by the defect and the direction of the current does not exceed 45 degrees. In order to obtain complete coverage of any castings by the prod method, it is necessary to explore the surface completely with the current flowing in one direction then re-explore with the current passing approximately at right angles to the direction previously used.

All over method—The "all over" method consists in clamping the electrodes at the extremities of the casting and passing the magnetizing current throughout the area between the connections. It is evident that a much higher current will be required than with the prod method in order to obtain the necessary magnetizing force at any desired point. In this method the current tends to fan out through the casting and, provided the necessary magnetizing force is obtained throughout the area, permits much more rapid testing than does the prod method.

There is a tendency when using this method for the current to follow the heavier sections, making it mandatory for thorough examination to provide a

(*Continued on page 276*)

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A Type V, driven by special 1/6 H.P. totally enclosed motor, with 20" sieve, has a capacity equal to 10 men riddling by hand. 4'6" high over all. Sieve may be removed in 5 seconds. Total weight, 100 lbs. Also made 36" dia.—Model V-5 with capacity equal to 30 men riddling by hand.

B Type CS makes two separations. No need to dump sieves, since refuse tails off to one side. 24" square sieve—permits continuous shoveling—1/3 H.P. motor—height 4'10" over all. Total weight, 295 lbs.

C Type CR has a special vertical 1/3 H.P. geared head motor, totally enclosed. It has a capacity equal to 20 men riddling by hand. Sieve measures 24" dia. Height 4'6" over all. Total weight, 250 lbs.

D Riddle for Type CS. 24" square. Has steel rim and bottom. Sieve bottoms are made of very heavy galvanized wire. Gauge and mesh should be specified when ordering. Mesh ranges from 2 to 8; gauge ranges from 14 to 20.

E Riddle for Type CR. Bottom is made of very heavy galvanized wire, and mesh and gauge also range from 2 to 8, and from 14 to 20. Has steel rim and bottom. Easily removed, dumped and replaced in about five seconds.

F Riddle for Type V and V-5. Sieve dia. for Type V is 20", that of Type V-5 is 36". Rims and bottoms are of steel. Mesh and gauge measurements same as other COMB'S riddles. Frame wears indefinitely.

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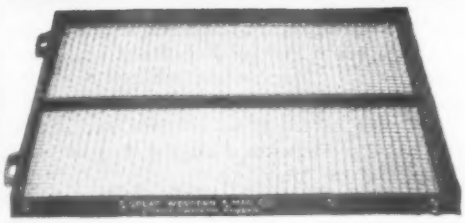

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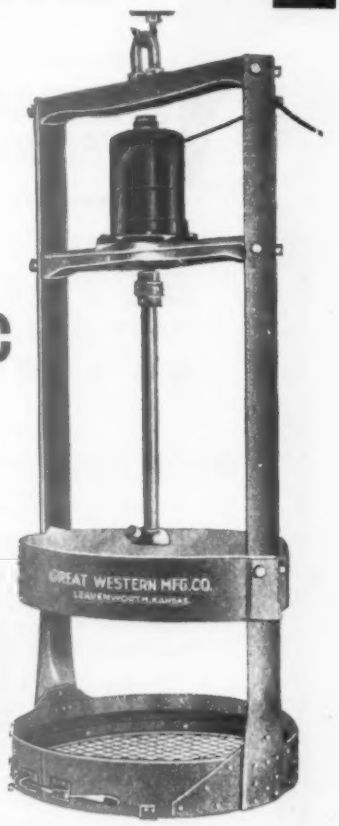

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1857 Carter Rd., Cleveland, Ohio

(*Continued from page 274*)

means of measuring the intensity and direction of the current at all important points. Such an instrument has been developed and is available for this purpose. In case the instrument indicates a current density too low for the registration of defects, it may be necessary to change the positions of the leads to provide sufficient current at these points. The all over method is discussed at length by Cotton ("Magnetic Inspection of Large Castings" A.F.A. *Transactions* Vol. 52, No. 1 September 1944, page 205).

Wrap Around Method.—When magnetically testing long cylindrical castings, it is sometimes advantageous to place several turns of the leads around the piece and pass the current through the coils thus formed. As in the all-over method, the use of a flux density meter should be used to determine the number of ampere turns required to provide the most efficient magnetizing force. The wrap around method applied as described will indicate to the best advantage defects running circumferentially about the piece.

In testing cylinders for longitudinal defects the leads may be threaded several times lengthwise through the bore of the casting. The actual ampere turns required should be determined by the use of a flux density meter.

Magnetizing equipment. — The chief requirement for magnetic powder inspection is equipment which will supply current of sufficient amperage at as low voltage as practicable.

Welding generators, when used with certain precautions, will serve to produce the required current for magnetic powder inspection when using the prod method. When amperage in excess of the capacity of a single generator is required, two or more machines may be connected in parallel. When using welding machines as the source of current, a contactor switch should be provided to break the circuit before removing the prods, since because of the comparatively high voltage involved, an excessive amount of arcing will occur if the circuit is broken by removing the prods. This arcing may cause surface cracking and in the case of higher carbon and alloy steels will produce hard spots which will interfere with machining. Arcing should be especially avoided on finished machined surfaces.

Storage batteries provide a readily portable source of current. Each storage cell will supply approximately 300 amperes and by connecting the cells in parallel, multiples of 300 amperes may be made available. Because of the low voltage (2 volts) there is no longer danger of harmful arcing and therefore no need for contactor switches. When using storage batteries care should be taken that individual contact periods be made as short as practicable consistent with efficient examination, in order to prevent excessive discharge of the cells. Because of the rapid discharge an ammeter should always be provided in the testing circuit in order to insure the necessary current density at all times.

Specially designed magnetic equipment is available which will provide a convenient means of obtaining any desired amperage for the prod method, all over method or the wrap-around method. Although convenient contactor switches are supplied the equipment is designed to work at low voltages, thus minimizing the dangers which might result from arcing.

Interpretation of results.—Probably one of the greatest restraints to the general acceptance of magnetic powder inspection of castings has been the fear on the part of the manufacturers that the persons interpreting the magnetic powder indications would not be sufficiently experienced to distinguish between harmful defects and indications resulting from incorrect magnetizing technique or slight surface defects which would in no way affect the serviceability of the part.

At a meeting of Navy representatives and representatives of a number of foundries producing Navy castings, it was decided that insufficient data was available to permit the preparation of standards of acceptance at that time. In the absence of such standards the Bureau of Ships has limited the use of magnetic powder inspection to the location of surface hot tears and cracks and permits further that when a surface crack is discovered which can be removed without reducing the section below the designed dimension, no repairs will be required provided the cavity is faired with the surrounding surface. In those classes of castings where small tears or cracks are permitted the acceptability of such defects shall be judged with regard to size, extent and direction by comparison with the Bureau Radiographic Standards.

Magnetic powder vs. radiography.—The Bureau of Ships has had the opportunity to interpret an exceptionally large number of radiographs from castings of various types and sizes to compare with the defects found with magnetic powder indications, also to observe the effects of such defects on the serviceability of the parts. The following conclusions can be drawn from this examination:

1. Magnetic powder inspection is specially suitable for surface hot tears and cracks, which are easily identified as such and is preferable to radiography for most cracks, especially in those areas which are too heavy for radiographing.

2. Correct interpretation of internal defects such as gas, sand, slag, and in most cases shrinkage is difficult, and in many cases impossible, by magnetic powder inspection. It is a simple matter, on the other hand, to determine by radiography the presence of such internal defects in amounts which might present a service liability.

3. Magnetic powder inspection is considerably faster than radiographic examination. Cases have been noted where, by subjecting the casting to

(*Concluded on page 278*)

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A New and Up-to-Date List of your Foundry Prospects and Customers

Widespread changes have occurred in foundries during the war years, and since the last issue of this well-known directory.

Authentic and accurately compiled, by The Foundry magazine, the 1945-46 edition of Penton's Foundry List is now being printed. Reserve your copy promptly so that you will have complete and up-to-date data on the more than 5,000 foundries of the U. S. and Canada. It will help you check your records, search out new prospects, and plan your sales effort in this important market, which promises to be one of the most active post-war industrial markets. Price of Penton's Foundry List complete — $50.00. Available only on order from The Foundry magazine.

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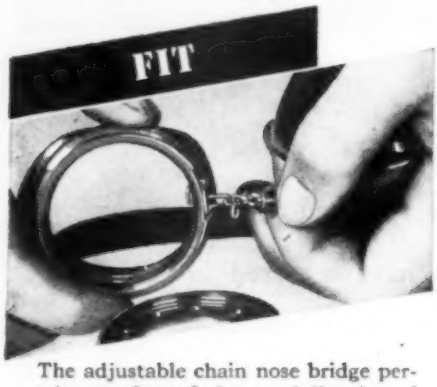

The adjustable chain nose bridge permits spacing of the specially shaped eye cups for proper fit. Adjustable headband holds cups snugly against the face. No pressure on nose, no high spot pressure on face when properly adjusted.

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(*Concluded from page 276*)

magnetic powder inspection and removing the defects before radiographing, the actual time and man-hours required for inspection and repair were reduced to a fraction of the time which would have been required had the part been radiographed only.

4. Magnetic powder inspection and radiography supplement each other in the inspection of castings. Neither one by itself will show conclusively the pressure of harmful defects in all areas.

Acknowledgment.—Grateful acknowledgment is made to the Norfolk Navy Yard, Naval Gun Factory and Naval Research Laboratory for furnishing the photographs used in this paper.

NEW TRADE PUBLICATIONS

SLUDGE PUMPS — Bulletin No. 1244, a 4-page folder recently published by Claude B. Schneible Co., 2827 Twenty-Fifth street, Detroit 16, describes horizontal and vertical type centrifugal sludge pumps which are available in a complete range of sizes and capacities ranging from 2 to 500 gpm. Specification tables giving approximate dimensions and capacities, together with sectional drawings showing construction details, are also given.

WELDING ELECTRODES—A comparison chart of welding electrodes, Bulletin B6344A, has been released by Allis-Chalmers Mfg. Co., Milwaukee 1, comparing equipment from 22 electrode manufacturers and gives information on stainless steel and hard surfacing electrodes, as well as the mild steel type. A section is devoted to a typical weld deposit analysis of stainless steel electrodes, percentages of chromium, nickel, carbon, columbium and molybdenum being shown.

FUSED SILICA, QUARTZ—A bulletin outlining the outstanding characteristics of a complete line of fused silica and fused quartz products, sold under the trade name "Amersil," is offered by Amersil Co. Inc., 60 Wall Tower, New York 5. Translucent, transparent, and opaque laboratory and metallurgical equipment, and equipment for industrial plants including pipe, elbows, return bends and traps, retorts, gas burners etc. are among the products manufactured.

GAS AND OIL BURNERS—Bulletin No. 902, published by the Peabody Engineering Corp., New York 19, describes and illustrates the mechanical and operating features of oil and gas burners for natural or forced draft operation and shows the types of atomizers used for oil firing. Copies may be obtained on request.

LIGHTING EFFICIENCY—Wabash Appliance Corp., 335 Carroll St., Brooklyn 31, N. Y., has prepared a booklet, No. 1-545, for lighting engineers, featuring a set of charts containing illumination values based on various spacings and mounting heights. Information on reduction of maintenance cost and attaining peak lighting efficiency is also included.

CHEMICALS—Cellulose products department of Hercules Powder Co., Wilmington, Del., has published a booklet entitled, "Chemicals for Industry," containing a list of chemical materials, types available, uses, packing and shipping information. The chemicals listed include nitrocellulose, cellulose acetate, and ethyl cellulose, used as bases for thermoplastics, and parlon, clorafin and sodium carboxymethylcellulose.

MEASURING INSTRUMENTS — "Quality Control," a new pocket-size handbook on scientific inspection, has been released by Continental Machines Inc., Minneapolis 4. Containing 140 pages, the book pictures precision measuring instruments in use, gives diagrams, charts, tables and photographs. The book is of particular value to plant inspection departments.

WELDING—Eutectic Welding Alloys Co., 40 Worth St., New York 13, in a new 6-page folder, describes how welding rods applied at low temperatures to cast iron, steel, aluminum, bronze, etc., produce clean strong bonds, leaving the welded part easily machinable. No new equipment is required for the new low temperature rods which can be used with any oxyacetylene torch or arc equipment.

MAGNESIUM CASTINGS — "Facts for the Designer," a 4-page brochure offered by Superior Bearing Bronze Co. Inc., 140 Banker St., Brooklyn 22, N. Y., explains the strength and fatigue values of magnesium sand castings, gives comparative properties of magnesium and other structural metals, and prescribes care that should be observed in their manufacture.

CASTINGS—Meehanite Research Institute, New Rochelle, N. Y., has published a new bulletin, No. 22, containing a collection of articles about meehanite castings which have appeared in various trade publications. They are divided and indexed according to subject. Design, gears, dies, brake drums, crankshafts, hardening and heat treatment, marine castings, machinery and milling cutters, and miscellaneous castings are treated.

TESTING SERVICE — Triplett & Barton Inc., Burbank, Calif., Dept. 54, offers an informative, 20-page booklet containing comprehensive data on metallurgical x-ray and other scientific testing equipment. The booklet catalogs the facilities available for testing service including metallurgy, electronics, radiography, analysis, engineering, testing and consultation.

WELDING AND CUTTING—Victor Equipment Co., 844 Folsom St., San Francisco has issued catalog Form 23, giving a complete description of its line of gas welding and cutting apparatus. Containing 104 pages, the catalog includes descriptions, sizes and uses of nozzles, gas torches, cutting tips and attachments, tip selection chart, manifolds, cylinder trucks, fittings, regulators and complete units.